COAST WATER WORKS DEVELOPMENT AGENCY
WATER AND SANITATION DEVELOPMENT PROJECT






FINAL REPORT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED MWACHE/WEST MAINLAND PIPELINE PROJECT - KWALE, KILIFI AND MOMBASA COUNTIES, KENYA

AUGUST 2024

Prepared By:

EMC Consultants
ENVIRONMENTAL KNOWLEDGE IN PRACTISE

Shelter Afrique Center, 3rd Floor Wing A
Longonot Road, Upperhill
P.O.BOX 9648-00100 Nairobi Kenya
Tel: +254 20 440 6162 | +254 722 579272
Email: info@emconsultants.org
Website: www.emconsultants.org

Project	Environmental and Social Impact Assessment for the proposed Mwache/West Mainland Transmission Line Project
Authors	EMC Consultants Limited Shelter Afrique Centre, 3rd Floor Wing 3A Upperhill, Longonot Road, Nairobi, Kenya P.O. Box 9648-00100 Nairobi, Kenya Cell: +254-722-579-272| 0722-320-543 Landline: +254-020-440-6162 info@emconsultants.org |www.emconsultants.org NEMA Registered firm of Experts License no – 6669
Reviewed by:	Tito Kodiaga (Principal) EMC Consultants NEMA Lead Expert | License no - 0160

Reviewed and Approved by: -	
Martin Tsuma **Ag. Chief Executive Officer** Coast Water Works Development Agency Mikindani Street, Off Nkrumah Road P.O BOX 90417-80100 Mombasa, Kenya.	**Sign:** ……

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ACRONYMS AND ABBREVIATIONS

AEZ	Agro Ecological Zones
AFD	Agence Francaise de Développement
ALARP	As Low as Reasonably Practicable
AoI	Area of Influence
BTS	Base Transmission Stations
CIA	Cumulative Impact Assessment
CLOs	Community Liaison Officers
CWSB	Coast Water Services Board
CWWDA	Coast Water Works Development Agency
EHS	Environmental, Health and Safety
EMCA	Environment Management and Coordination Act, 1999
EPZ	Export Processing Zone
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
FGDs	Focus Group Discussions
FOSA	Front office Savings Activity
IFC	International Finance Corporation
ITCZ	Inter-Tropical Convergence Zone
KNBS	Kenya National Bureau of Statistics
KWAWASCO	Kwale Water and Sewerage Company
LHS	Left Hand Side
MOWASSCO	Mombasa Water Supply and Sanitation Company Limited
MWSI	Minsitry of Water and Sanitation and Irrigation
NEMA	National Environment Management Authority
NLC	National Land Commission
PAPs	Project Affected Persons.
PDO	Project Development Objective
SACCO	Savings and Credit Cooperative Societies
SEP	Stakeholder Engagement Plan
VEC	Valued Environmental and Social Components
VSLAs	Village Savings and Loans Associations
WB	World Bank
WML	West Mainland
WSDP	Water and Sanitation Development Project
WSPs	Water Service Providers
WTP	Water Treatment Plant

EXECUTIVE SUMMARY

This Environmental and Social Impact Assessment (ESIA) Study Report presents an assessment of the potential environmental and social impacts associated with the proposed construction of the Mwache/West Mainland and Changamwe Transmission pipeline ("the Project") to ensure that environmental and social aspects are diligently considered and managed during the Project lifecycle. This ESIA Study report has been prepared by **EMC Consultants Limited** for Coast Water Works Development Agency (CWWDA) ("the Proponent") which is to put up approximately 20.5 km long treated water transmission pipeline along a 6 meter-wide corridor including ancilliary infrastrutures mainly 2Nr. reservoirs, staff and guard houses and access roads to the ancilliary infrastructures.

The proposed construction of the Mwache/West Mainland and Changamwe Pipeline (the "Project") is to be financed under the Water and Sanitation Development Project (WSDP, P156634.), which is a World Bank supported project. The Project Development Objective (PDO) of WSDP is to improve water supply and sanitation services in selected coastal and North-Eastern regions in Kenya. This project has four components.

1) The first component, Rehabilitation and expansion of urban water supply and sanitation services in the coastal region, has the following subcomponents: (i) Support to coastal counties; and (ii) Support to the coast bulk water services provider.
2) The second component, Expansion of water supply and sanitation services in underserved north eastern counties, aims to finance a program of activities designed to improve water supply and sanitation services in the northeastern counties, such as Wajir town in Wajir County and the Dadaab refugee camp host communities in Garissa County.
3) The third component, National performance-based financing, has the following two subcomponents: (i) Support for water and sanitation infrastructure investments and services; and (ii) Technical assistance for national performance-based financing.
4) The fourth component, Project management, finance a program of activities designed to strengthen the capacity of the Recipient for project management, implementation and coordination, and Monitoring and Evaluation (M and E).

At present, Mombasa City is served by the following bulk water sources, which also supply other towns in the neighbouring counties; data based on the Mombasa Water Distribution Network Master Plan (MIBP & Nippon Koei, 2017):

- Baricho wellfield: capacity is estimated at 110,000 m^3/d, supply to Mombasa is 45,000 m^3/d
- Mzima springs: capacity is estimated at 35,000 m^3/d, supply to Mombasa is 15,000 m^3/d
- Marere springs: capacity is estimated at 12,000 m^3/d, supply to Mombasa is 2,500 m^3/d
- Tiwi Wellfield: capacity is estimated at 10,000 m^3/d, supply to Mombasa is 2,000 m^3/d

The total average current supply to Mombasa County is approximately 46,500 m^3/d against a demand of 184,373 m^3 per day according to the Water Distribution Master Plan.

To bridge the huge deficit currently experienced in Mombasa and to meet future projected water demands, the Ministry of Water and Sanitation and Irrigation (MWSI) commenced planning for new projects among them being Kenya Coastal Region Water Security and Climate Resilience Project (P145559) another Bank financed project which will construct the Mwache Dam Water Supply project which is expected to evacuate water to residents of Mombasa via the proposed West Mainland Transmission Line Project. A schematic diagram showing the proposed project components of the Mwache Dam Water Supply System and their respective financing agencies is given in Figure E-1 below.

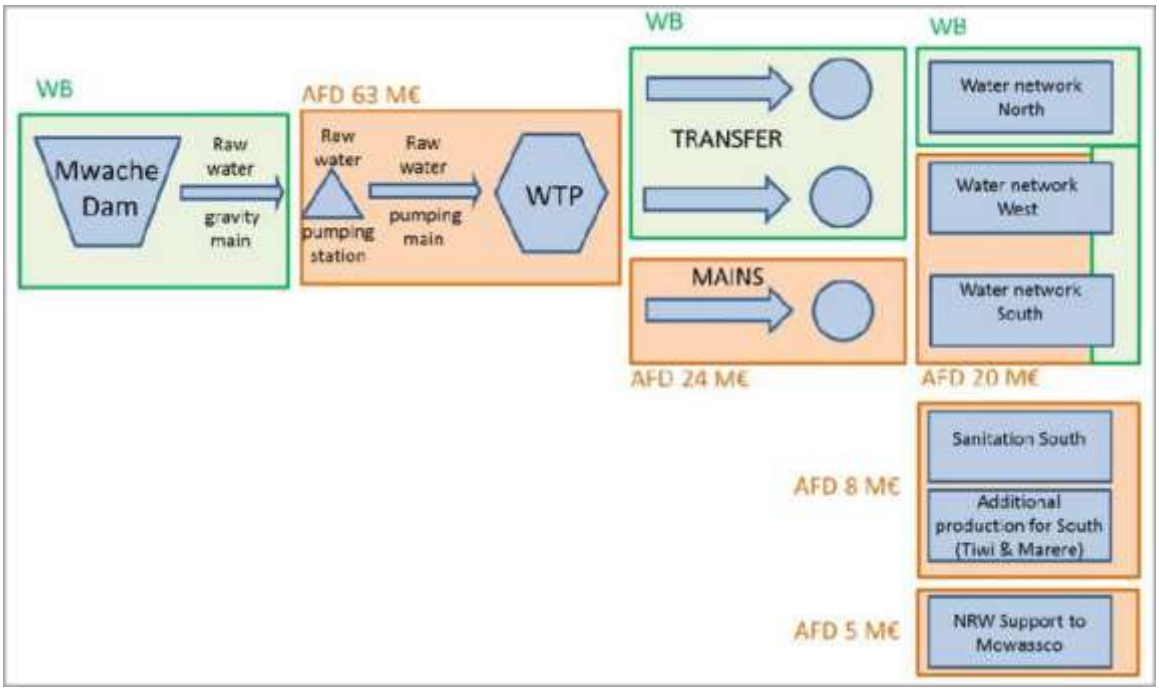


Figure E- 1: Components of the Mwache Dam Project and respective Financing Agencies

Existing Water Distribution System for **West Mainland Supply Area**

The West Mainland service area is mainly supplied from the Mzima system via the Mazeras reservoirs (81,000 m^3) located within Mazeras Town, along the Nairobi-Mombasa Highway. The Mazeras reservoirs are located at an elevation of 160 masl. The full storage capacity of the Mazeras reservoirs is currently unavailable due to the dilapidated condition of one of the reservoirs. Some parts of the West Mainland service area are supplied by off-takes from the Marere Pipeline whose source is the Marere springs. Water demand for West Mainland service are as projected to be 64,661m/per day in 2025, 72,970m^3/per day in 2030 and 82,675m^3/per day in 2035.

Project Proponent

CWWDA, formerly known as Coast Water Services Board (CWSB) under the Water Act 2002, is one of the nine water works development agencies in Kenya, constituted under provision of the Water Act 2016. CWWDA ensures provision of quality and affordable water and sewerage services in its area of jurisdiction within Mombasa, Kilifi, Kwale, Lamu, Taita Taveta and Tana River Counties through its appointed Water Services Providers (WSPs).

Under the Water Act 2016, CWWDA has been bestowed the responsibility of developing sources and infrastructure for bulk water supply to the above Counties. CWWDA is the Implementing Agency for the proposed construction of the West Mainland Transmission Line Project under WSDP. Mombasa Water Supply and Sanitation Company Limited (MOWASSCO) is the Water Service Provider (WSP) for Mombasa City.

Project Financier

The project is funded by the Government of Kenya (GoK), World Bank (WB) and French Development Agency (AFD). The funding is processed through CWWDA which is the implementing agency for the Mwache Water Transmission Pipelines and Terminal Reservoirs Project. The project beneficiaries will be the residents of Mombasa city.

Project Description

The proposed Mwache/West Mainland and Changamwe water transmission pipeline line ('the Project') traverses three counties i.e. Kwale County, Mombasa County and Kilifi County. The transmission lines start with a 2.9 km common section of the transmission mains at the proposed West Mainland Reservoir at an outlet elevation of 95 masl, traversing south easr to cross the Nairobi-Mombasa Highway at approximately 250m south east of the reservoir site. Upon crossing the Nairobi-Mombasa Highway, the transmission pipeline traverses southeast, along the Highway for approximately 2.2km to the Mombasa Southern By-Pass interchange at Ch. 2+465. Upon crossing the interchange, the transmission pipeline branches into two pipelines, one 8.9km pipeline serving the West Mainland demand area (West Mainland service line) and the second 8.9km pipeline being an express main transmitting the Mombasa Island flow allocation from the West Mainland Reservoir to the Changamwe reservoir. The two pipelines continue along the Nairobi-Mombasa Highway, one pipeline on either side of the highway, for 8.9 km to the existing Changamwe reservoir site at Birikani.

Numerous en-route offtakes will be provided on the West Mainland Transmission Main, connecting to the existing network within the West Mainland area and replacing the existing twin Mzima Pipelines. Existing offtakes will be transferred to the new pipeline. At Jomvu, one of the existing twin Mzima Pipelines branches off to join Magongo Road while the other continues along the Nairobi-Mombasa highway.

The proposed transmission mains will continue along the highway to the Changamwe reservoirs, with an offtake to serve the existing connections on the Mzima Pipeline branching to Magongo road. The offtake will be connected to the recently constructed DN 500 Marere Pipeline, which runs parallel to the Mzima Pipeline along Magongo Road. The existing offtakes on the Mzima Pipeline will need to be transferred to the DN 500 Marere Pipeline, to continue serving the area. The transmission pipeline length is 20.6km running from the proposed West mainland reservoir in Kwale County and terminating at the Changamwe reservoir in Mombasa County on a proposed 6 metres wide Right of Way (RoW). Table E-1 below highlights the transmission line route including the project Area of Influence (AoI) of the transmission line.

Table E- 1: Transmission pipeline route description

Section	Chainage	Description

1	0+000	West Mainland Reservoir Outlet at 95 masl
2	0+000 – 0+250	• Pipeline section traverses S.E. through a private parcel of land to the Nairobi – Mombasa Highway. • Pipe crosses the Nairobi-Mombasa Highway at Ch. 0+250 to the left hand side. • Resettlement needed and RAP report has been prepared and includes compensation of the Project Affected Household (PAH).
3	0+250 – 2+204	• Pipeline section along the Nairobi-Mombasa Highway up to Ch. 0+250 • At the Mombasa Southern By-Pass, the pipeline crosses the interchange on the left hand side (LHS) of the highway. • Pipeline to be laid across the road via trenchless tunnelling • 3Nr. road crossings on interchange section. • Section is encroached and resettlement needed. RAP report has been prepared and includes compensation of the Project Affected Households (PAH)/encroachers.
4	2+204 – 2+900	• Pipeline section along the Nairobi-Mombasa Highway, on LHS of the highway. • At Ch. 2+900, Pipeline branches into two Pipelines, forming a twin main, one pipeline transmitting the flow allocation for the Island to Changamwe Reservoirs and the second to serve the West Mainland supply area. • Dedicated Pipeline to Changamwe crosses the Nrb-Msa highway, to the righthand side of the road. • Pipeline designated to serve the West Mainland area remains on the left hand side of the road. • Section is encroached and resettlement needed. RAP has been prepared and includes compensation of the Project Affected Households (PAH)/encroachers.
5	2+700 – 11+470	• Pipeline proposed to be laid to replace the existing DN 500 twin Mzima Pipelines along the highway. • The WML pipeline, on the LHS of the road leaves the Nrb-Msa highway road reserve at Ch. 3+620 and follows an access road behind the first row of buildings, crossing a stream adjacent to the road-side dump site at Miritini,then back along the highway at Ch. 4+005. The pipeline to Changamwe continues on the RHS of the highway. • Stream crossing at Ch. 3+880, adjacent to an existing temporary dump site within Miritini. • Pipeline route characterized by numerous paved and unpaved road crossings, including but not limited to; - Link road to Magongo road at Ch. 6+800 - Road to Jomvu kuu at Ch. 6+880 - Junction to Mikindani at Ch. 9+200fr - Several paved access roads to estates, industrial parks, business premises, etc.

		- 1Nr. Railway crossing on the old meter gauge railway for each of the 2Nr. pipelines at Ch.. 10+945 in Changamwe. • The express pipeline to Changamwe reservoirs on the RHS crosses the highway at Ch.11+470, entering the Changamwe Reservoir site. • The pipeline on the LHS of the highway goes past the Changamwe reservoir site and terminates at the refinery road junction. • The pipeline route on both sides of the highway is characterized by numerous encroachments in form of temporary and permanent structures and buildings, etc. A Resettlement Action Plan report has been prepared and 274 Project Affected Households (PAHs) have been identified who shall be compensated for the loss of structures and income based on the World Bank OP 4.12. Out of the 274 PAHs, there is one land owner who is entitled for compensation for loss of land and 273 PAHs who are categorized as encroachers on the GoK ROW and entitled for compensation for loss of structures and income only.
6	11+470 – 11+670	• Pipeline section within the Changamwe Reservoir Site (new reservoir to be built). • Terminal point of the pipeline at Ch. 11+670. • Resettlement not required at the proposed reservoir site which is on land already owned by CWWDA and currently used as reservoir.

Ancillary Infrastructures

2 Nr. reservoirs are proposed namely Changamwe Reservoir proposed to be constructed within the site for the existing Changamwe reservoir situated along the Nairobi-Mombasa highway, adjacent to the Refinery Road Junction, and West Mainland Reservoir located within Bonje area, approximately 150m to the East of the Mombasa-Nairobi Highway and 200m North West of the old meter gauge railway line. They will be rectangular shaped reinforced concrete water storage tanks with two compartments and a 14,000m^3 capacity, with a depth of 5m.

2 Nr. double unit semi-detached staff houses (4Nr. units), each of internal floor area 40m with a kitchen, one bedroom, living room, toilet and washing facilities have been provided for each of the new reservoir sites. A guard house with an operations office will be provided at the gate, to regulate and keep records of visitors and for general operation and maintenance of the reservoir. The proposed reservoir sites have no existing access roads. New gravel all weather access roads will be constructed to facilitate all weather motorable access, especially for supply of chlorine and any pipes or fittings that may be required under repair and maintenance operations.

The total size of land to be acquired for the construction of the ancillary infrastructure is 8.65 acres. The reservoir and staff housing at the changamwe reservoir are to be located on land that is owned by CWWDA and already has an existing reservoir and offices. No displacement

impacts are expected. The new reservoir and staff housing to be constructed in Bonje will require land acquisition, and RAP report has been prepared for the anticipated economic displacement.

Construction Activities

The construction activities associated with the transmission pipeline and ancilliary infrastructures are shown in table below.

Table E- 2: Construction Activities

Activity	Timeline
Trenching/digging of trenches, open cuts (road crossings),	Use of mechanical excavation with limited manual excavation as determined by contractor.
Transport of pipelines	2 trucks transport pipelines to project site only once a day based on distance trenched/excavated. They drop the pipes and return back to storage yard.
Laying of pipelines	Pipes laid on the same day based on excavated distance.
Covering trenches using excavated stockpile material	All trenched/excavated sections are covered back-filled same day. No backfill material is left overnight unless weather conditions do not allow i.e. heavy rains limiting backfilling. To minimise sediment run-off, when not possible to back fill all trenches on the same day, all appropriate and deasible measures will be taken to minimize sediment run-off
Stabilising pipeline	Excavated and backfilled area is stabilised immediately after the backfilling and if need be revegetation is undertaken.
Reinstating of excavated roads	If the roads are excavated, the reinstating happens same day. The project will use in most instance micro-tunnelling in order to avoid destruction of the roads.
Civil works for ancilliary infrastructures	Site reinstatement after completion of the reservoirs, staff and guard house and access roads.
Contractor's camp and yard	Contractor shall identify storage yard and camp locations once awarded contract. Contractor shall prepare separate ESIA for such facilities and seek approval for the same.

Raw Materials

During the construction phase, it can be expected that the following raw materials will be required:

- PN 10 UPVC Pipes (DN 1200-DN700)
- PN 10 HDPE Pipes (DN 1200-DN700)
- PN 10 Steel Pipes (DN 1200-DN700)
- Valves and penstocks;
- Water (approximately 12,000m^3) for dust suppression, hydrotesting, concrete works etc. from a municipal water supply/WSP metered connection or suitable community water source
- Fuel for running motorized equipment.
- Steel valves and fittings
- Sand, aggregate, cement,

- Gravel
- Roofing material (iron sheets)
- Timber
- Steel

Table E- 3: Pipeline Length and Diameter

Diameter	Length	Proposed Material
Westmainland Section		
1200/1000/900	7km	Steel or Ductile iron
400	4.6km	Steel or Ductile iron
Changamwe Section		
700	8.9km	Steel or Ductile iron

All the raw materials highlighted above will be sourced from the local suppliers of building and construction materials within the local towns. The project will not open up any quarries, borrow pits etc. to source for construction materials.

Equipment and Machinery

Table below highlights a list of some of the equipment and machinery that will be used in the construction phase of the project.

Table E- 4: Equipment and Machinery

Description
Excavators >0.5m3
Trucks > tonnes
Total station and ancillaries
Pipe jacking equipment, > DN 200mm
Concrete vibrators
Rock breaker
Back hoe excavator
Water bowser
Jack hammer
Pipeline pressure testing equipment
4WD Pick up
Compressor
Butt fusion equipment
Generators

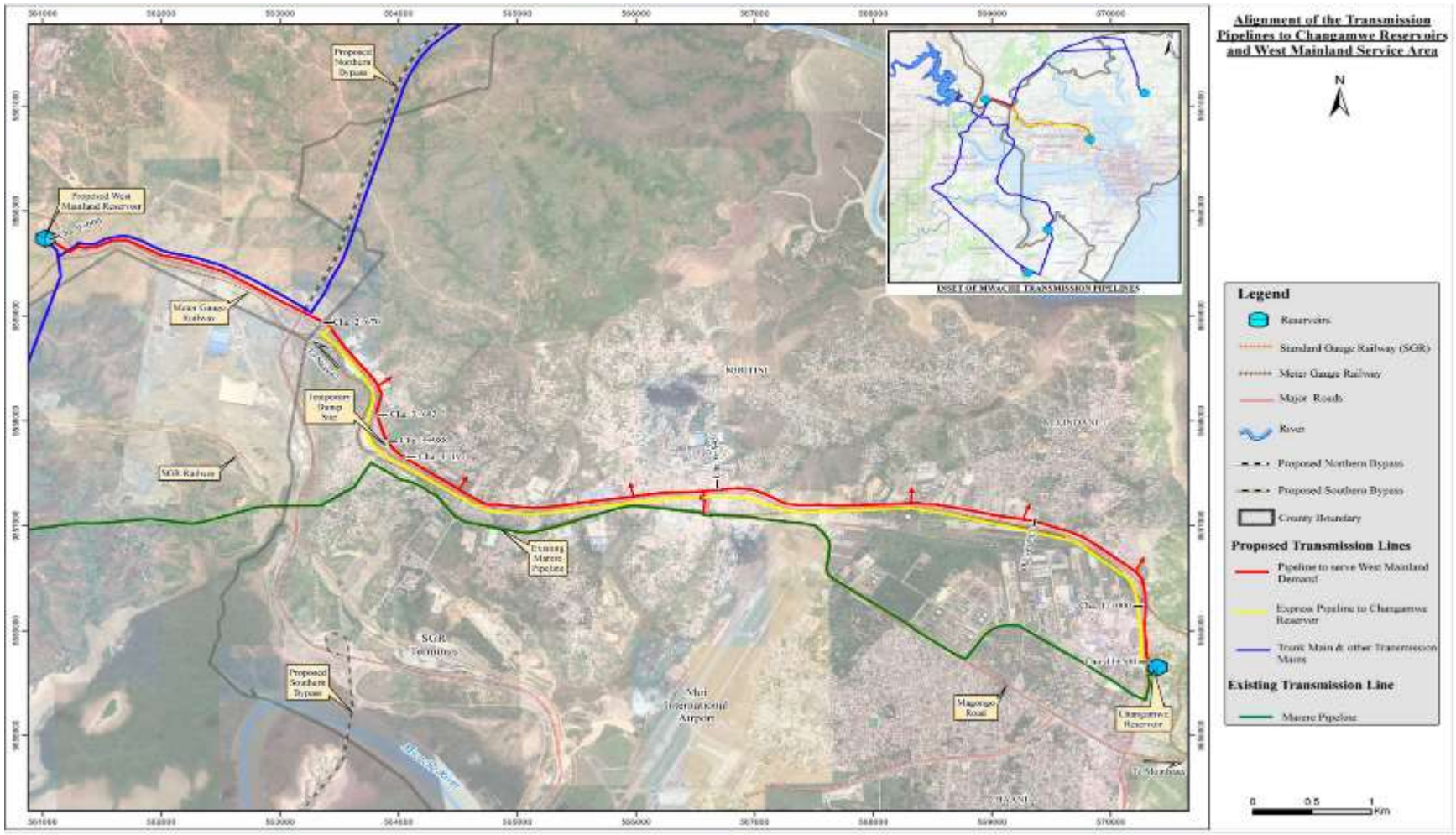
Figure E-2 below shows the route alignment of the West Mainland and Changamwe transmission pipeline. The red line indicates the section of the pipeline from the proposed new Bonje reservoir to West Mainland which is 11.6km and the yellow line is the express line from the Bonje reservoir to Changamwe (island allocation) as further depicted in table E-5 below. The blue line indicates the trunk main from the WTP to the Bonje reservoir and other transmission mains (South Mainland) which are outside of the scope of the ESIA. The green

line is the existing Marere Springs pipeline. **Table E-5** shows the West Mainland and Chamgamwe section of the pipeline and different sections (by length) and pipe diameter

Table E- 5: Dedicated Transmission Mains to Westmainland and Changamwe

Pipeline	Section	Length (km)	DIA (mm)
Transmission Main			
Transmission Main and Service line to West Mainland	Section 1	2.7	1,200
	Section 2	2.9	100
	Section 3	1.4	900
	Section 4	4.6	400
	Subtotal	11.6	
Express Transmission Main to Changamwe (island allocation)	Section 1 (full length)	8.9	700
Transmission Mains Total	20.5		

Figure E- 2: West Mainland Alignment



ESIA Study Objectives

The ESIA study has been developed in compliance with the Environmental Impact Assessment/Audit Regulation, 2003, and relevant World Bank (WB) environmental and social safeguard policies with emphasis on O.P 4.01 on Environmental Assessment. The purpose of an ESIA is to provide information to regulators, the public, and other stakeholders to aid the decision-making process. The objectives of an ESIA are to:

- Define the scope of the project and the potential interactions of project activities with the environment (natural and social).
- Identify relevant national and international legislation, standards and guidelines and ensure that they are considered at all stages of project development.
- Describe the proposed project activities and the existing environmental and social conditions that the project activities may interact with.
- Predict, describe, and assess impacts that may result from project activities and identify mitigation measures and management actions to avoid, reduce, remedy or compensate for significant adverse effects and, where practicable, to maximize potential positive impacts and opportunities.
- Provide a plan for implementation of mitigation measures and management of residual impacts as well as methods for monitoring the effectiveness of the plan.

ESIA Methodology

The approach taken in this study is guided by the principles of integrated environmental management. The approach is therefore guided by the principles of transparency which is aimed at encouraging decision-making. The underpinning principles of integrated environmental management are:

- Informed decision-making;
- Accountability for information on which decisions are made;
- Consultation with stakeholders;
- Due consideration of feasible alternatives;
- An attempt to mitigate negative impacts and enhance positive impacts associated with the proposed project;
- An attempt to ensure that social costs of the development proposals are outweighed by the social benefits;
- Regard to individual rights and obligations;
- Compliance with these principles during all stages of planning, implementation and decommissioning of the proposed development; and
- Opportunities for public and specialist input in the decision-making process.

The study has also been guided by the requirements of the EIA Regulations set out in terms of the Environment Management and Coordination Act, 1999 (EMCA) revised in 2015. The ESIA was carried out through analysis of various environmental and social parameters, field investigations and stakeholder consultations.

Desktop Studies

This mainly involved;

- Review of the detailed design study report for Mwache West Mainland and Changamwe Pipelines
- Review of relevant existing legislation, regulation and policies relevant to the proposed Project.

Field Investigations

Activities implemented during field investigations involved;

- Site visits to the project area and the neighboring areas within the zone of influence of the project to collect primary baseline environmental and socio-economic data.
- Photographing the significant aspects to aid in describing baseline environmental and social conditions of the Project area and its influence zone.
- Acquisition of relevant documents from the authority such as County government departments, among others which were within the Project influence zone.
- Public consultation in form of onsite key informant interviews with various departments within the county government (water, roads, lands), questionnaires distributed randomly to the residents within the project area; ad hoc interviews with interested persons; and public consultation meetings in form of a meeting with the public.
- Identification of sensitive receptors including health facilities, religious facilities, educational institutions among others along the project site.

The main purpose of the field investigation was to verify information and data collected during the desktop study and collection of any new information that may assist in the assessment of impacts and design mitigation measures as well as undertake stakeholder consultations with the communities within the Area of Influence (AoI).

Environmental and Social Safeguard Standards, Policies and Regulations

This ESIA was prepared in compliance with World Bank safeguard policies and also in compliance with Kenya's environmental law and regulation.

National Legislations and Regulations

- National Environment Policy (NEP) 2012
- National Water Policy 2012 (Draft)
- The National Envionmental Sanitation and Hygiene Policy-July 2007
- National Policy on Water Resources Management and Development (Sessional Paper No. 1 of 1999)
- Kenya Vision 2030
- National Climate Change Respose Strategy 2021-2026
- Climate Change Policy Framework 2016
- Big 4 Agenda

- National Gender and Development Policy 2019
- Constitution of Kenya (CoK) 2010
- Environmental Management and Coordination Act (EMCA) 1999 Cap 387
- Environmental Management and Coordination (Amendment) Act, 2015
- Environmental (Impact Assessment and Audit) Regulations, 2003
- Environmental Management and Co-ordination (Water Quality) Regulations 2006
- Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009
- Environmental Management and Co-ordination (Waste Management) Regulations 2006
- Environmental Management and Coordination (Air Quality) Regulations, 2014
- The Physical and Land Use Planning Act, 2019
- The Public Health Act (Cap 242)
- Occupational Safety and Health Act (OSHA), 2007
- The Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005
- Water Act 2016
- Employment Act 2007
- The Land Act 2012
- National Gender and Equality Commission Act 2011
- Children Act, 2001
- Sexual Offences Act, 2006
- County Government Act 2012
- Kenya National Youth Policy 2006
- HIV/AIDS Prevention and Control Act 2006
- County Government Act 2012
- Labour relations Act, No 65 of 1995.
- Environment and Land Court Act, 2011

World Bank Safeguards Policies

The following World Bank safeguards policies have been triggered by the project as reflected in the Environmental and Social Management Framework (ESMF) for WSDP;

- World Bank OP 4.01 on Environmental Assessment
- World Bank OP 4.12 on Involuntary Resettlement
- World Bank OP 4.11 on Physical Cultural Resources

Project Area Environmental and Social Baseline

The proposed transmission pipeline traverses three coastal counties namely Kwale, Kilifi and Mombasa Counties.

Biophysical Environment

Kwale County is one of the 47 counties in Kenya. It is located in south coast of Kenya, it borders the Republic of Tanzania to the South West, and the following Counties; Taita

Taveta to the West, Kilifi to the North, Mombasa to the North East and the Indian Ocean to the East. Kwale County covers a total surface area of 8,270.2 square km and accounts for 1.42 per cent of Kenya`s total surface area. **Mombasa County** is located in the South Eastern part of the Coastal region of Kenya. It covers an area of 229.9 Km^2 excluding 65 Km^2 of water mass which is 200 nautical miles inside the Indian Ocean. It borders Kilifi County to the North, Kwale County to the South West and the Indian Ocean to the East. The County lies between latitudes 3^0 56' and 4^0 10' South of the Equator and between longitudes 39^0 34'and 39^0 46'east of Greenwich Meridian. Kilifi County is one of the six counties in the Coast region of Kenya. The County lies between latitude 2^0 20" and 4^0 0" south and between longitude 39^0 05" and 40^0 14" East. Mombasa County is divided into six administrative sub-counties namely: Mvita, Nyali, Changamwe, Jomvu, Kisauni, and Likoni and thirty county assembly wards. **Kwale County** comprises of five administrative sub-counties (KNBS, 2019) namely Matuga, Kinango, Lunga Lunga, Msambweni and Samburu. Kilifi county has seven sub counties namely: Kilifi North, Kilifi South, Ganze, Malindi, Magarini, Rabai and Kaloleni.

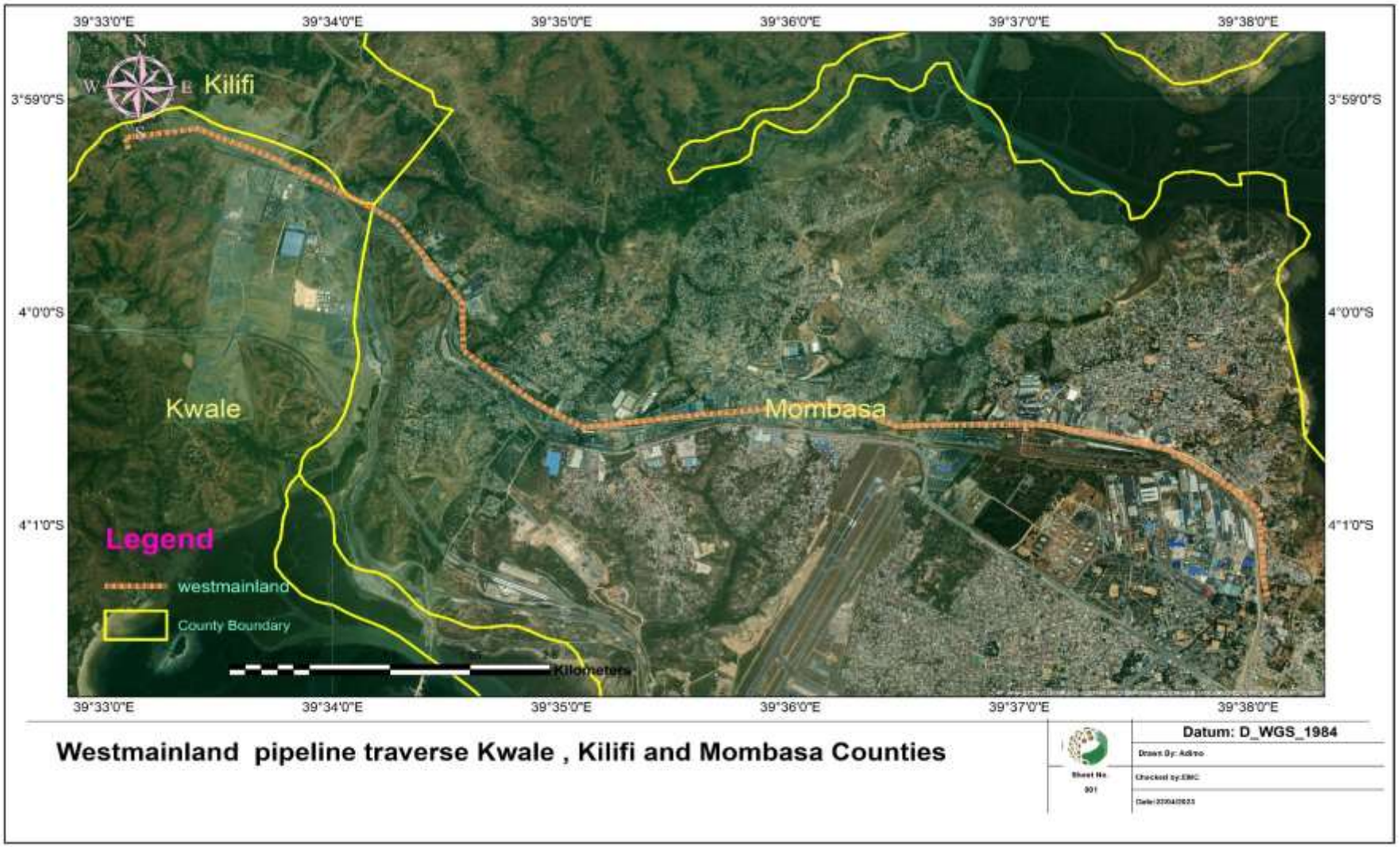


Figure E- 3: West Mainland Pipeline and Counties traversed

Climatic Conditions

Kwale County has monsoon type of climate which is hot and dry from January to April/May, while the period from June to August is the coolest in the year. Rainfall is bi-modal with short rains being experienced from October to December, while the long rains are experienced from March/April to July. The total annual precipitation varies from 900 mm to 1500 mm per annum along the coast to 500 mm to 600 mm per annum in the hinterland. The average annual rainfall ranges from 600mm in the hinterland to 1200 mm at the coastal belt. The coastal belt receives an average annual rainfall of a 1000mm with a marked decrease in intensity to the north and the hinterland. Historical records indicate a significant increase in average temperatures over the past 20 years, with the number of heat- and drought-stressed days expected to continue to increase under future climate projections. This is majorly as a result of the climate change.

The climate in **Mombasa County** and that of the proposed project site is generally associated with the regional climatic patterns attributed to the semiannual movement of the inter-tropical convergence zone (ITCZ) as well as the two monsoons experienced in the area, namely, the northeastern monsoon in January to March and the southeastern monsoon in June-October. The dominant rainy season occurs in the March-June period while the short rains are in November to December. The average annual rainfall is approximately 1000mm.

Kilifi County county has a bimodal rainfall pattern with average annual precipitation ranging from 300mm in the hinterland to 1,300mm in the coastal belt. The coastal belt receives an average annual rainfall of about 900mm to 1,300mm while the hinterland receives average annual rainfall of about 300mm to 900mm.

Topography

The topography of the West Mainland area comprises of a ridge line on which the Nairobi-Mombasa Highway is located, with the ground sloping on both sides to low points of up to sea level. The ridge line (Nairobi–Mombasa highway) also slopes from Mazeras at 160m amsl to 65m at the Changamwe reservoirs, and further to sea level at Makupa Bridge.

Biodiversity

Flora

Flora along the proposed water transmission pipelines route to the West Mainland and Changamwe is influenced by anthropogenic activities associated with the Nairobi–Mombasa Highway. Almost the entire 20.6 km of the pipeline is within the road reserve, with minimal vegetation cover and isolated grassland and shrubs.

The lowland ranching zone varies in altitude from 90 masl to 300 masl, with a mean annual temperature of 27^0 C and annual precipitation of 350-700mm. Major activities within this zone include subsistence livestock rearing. Coconut-Cassava Zone: This zone has the highest potential for crop production in the county, spreading along the coastal uplands and low-level coastal plains. Major farming activities include tree cropping (mango, citrus, cashew nuts, and coconuts), vegetables (chilli, brinjals, okra etc.), food crops (maize, bananas, cowpeas, green grams etc.) and upland rice. Dairy farming also

does well in this zone. It has an average precipitation of 1,300mm per annum and mean annual temperature of 24^0C.

Figure E- 4: Photographs illustrating nature of vegetation cover within the project area

Fauna

Avian population dormant in the coastal region including the Project area for the proposed Transmission Mains to the West Mainland and Changamwe include; Southern Banded Snake-eagle Circaetus fasciolatus (Near Threatened); Brown-headed Parrot Poicephalus cryptoxanthus (least concern), Fischer's TuracoTauraco 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). Fish catch in streams and rivers within the coastal belt including stream include Rabbit fish (Tafi), Redfin robber (English), Nkwakwa (Pokomo), Milkfish (English), Scavengers (Tangu), Mullets (Mkizi), Sardines (Simu), Snappers (Pali).

Avifauna

In the Mwache Forest, which is approximately 5km from the proposed reservoir in Bonje, there are 2 species of birds that are endangered including Spotted Ground-thrush (*Zoothera guttata) and* Sokoke Pipit (*Anthus sokokensis)*. The transmission line is not located inside Mwache Forest which is a protected/gazetted ecosystem and does not pass through it hence potential impacts on the species not likely because of the lack of interaction of project activities with the ecosystem. The Mwache Forest is approximately 4kms from the starting point of the transmission line. Further, the construction activities are unlikely to present any direct threat to the species. There are no fauna including avifauna species that are categorised as Critically Endangered (CR) or Endangered (EN) in the section of the pipeline traversing Mombasa County. This section of the pipeline is in an urban area with primarily extensively modified habitats.

Figure E- 5: Protected areas along West Mainland pipeline route

Drainage and Hydrology

Transmission Pipelines to the West Mainland and Changamwe

The topography of the West Mainland area comprises of a ridge line on which the Nairobi-Mombasa Highway is located, with the ground sloping on both sides to low points of up to sea level. The ridge line (Nairobi–Mombasa highway) also slopes from Mazeras at 160m amsl to 65m at the Changamwe reservoirs, and further to sea level at Makupa Causeway. This ridge line influences drainage and hydrology with most section served by roadside drains that flow into Misufini, Kwahakatsa, mtsopuni and Kombeni streams and other natural water courses that drain runoff from the Nairobi-Mombasa Highway.

Figure E- 6: Kwahakatsa Stream at Jomvu area and Road side drainage infrastructure at Mikindani Intersection.

Geology And Soils

Geology

The project area can be categorized into three physiographic belts i.e.:-The 'Coastal Plain', which forms the white sandy beaches next to the Indian Ocean. The land formation is a build-up of eroded reef material i.e. corals, sand and alluvial deposits on the inshore side of the reef. The 'Foot Plateau' occurs after the coastal plain, made up of Jurassic shale rock which is broken/dissected through erosion. In some places, it is overlain with residual sandy plateau. This is found mainly in the entire proposed Transmission Mains to the West Mainland and Changamwe from Ch. 0+000 to Ch. 11+670. The Nyika Plateau is in the higher areas covered by Duruma Sandstone series and older rocks to the west.

Soils

The soils along the proposed transmission pipeline corridor to the West Mainland and Changamwe can be categorised into two main types as provided in the Kenya Soil Survey Report; (i) Soils Developed in Shales: These soils are heavy and moderately to highly fertile. They are an association of: (a) well drained to imperfectly drained; shallow to moderately deep; yellowish brown to very dark grey; firm to very firm clay, dissected parts (eutric CAMBISOLS, partly lithic phase and (b) imperfectly drained, deep, dark grey very firm clay, with humid topsoil and sodic deeper subsoil or interfluves (verto luvic PHAEOZEMS sodic phase, with vertic Cambisols, sodic phase). The soils are found near Mtwapa to the north and Mazeras to the North West.

Proposed pipeline routes for the West Mainland project comprise of soils developed on higher level lagoonal deposits (kilindini sands). Soils in this category are light and of low to very low fertility. They are excessively drained, very deep, reddish yellow to white, loose sand to loamy (albic and ferratic Arenosols). These soils are predominant at Port Reitz and Changamwe.

Figure E- 7: Soil type along the proposed transmission mains to the West Mainland

Project Alternatives

Alternative Route: The alternative to the project mainly alternative route has been incorporated into the design of the proposed pipeline and considered under this ESIA. In addition being that the project area is urban, no further alternative sites were looked into due to the fact the pipelines do not pass through any environmental sensitive areas that require avoidance as such the option of maintaining the pipelines within existing road reserves, access routes was incorporated into this report. Other altenatives considered included alternative water supply and transmission sources other than from the WML e.g. roof catchment, boreholes, surface water etc, alternative construction materials and "no project" alternative.

Public Consulations

Stakeholders were identified, mapped, and consulted as part of the ESIA study in line with the OP. 4.01 with respect to stakeholder consultations and in accordance with the NEMA's EIA/EA regulations (2003) which require public consultations during ESIA preparation. The consultations targeted communities who were in the project Area of Influence (AoI) and hence likely to be direcly or indirectly affected adversely by the project. Consultations also targeted key institutions in the national and county governments who were identified to have a stake or interest in the project. Tables **E-6 to E-10** below shows the dates, venues and number of stakeholders consulted by county. Consultations were a mix of key informant interviews and public meetings. Socio-economic data of Project Affected Households (PAHs) within the road reserve was also collected using questionnaires and form part of chapter 5.

Table E- 6: Mombasa County Stakeholder Consultations Venues, Dates and Participants

Date	Venue	Participants	Males	Females
3/11/2022	CWWDA Office	9	7	2
3/11/2022	County Commissioner's office	3	3	0
25/11/2022	Governor's Office	3	3	0
9/11/2022	Deputy County Commissioner's Office-Jomvu Sub County	4	3	1

25/11/2022	MOWASSCO Offices	3	3	0
7/11/2022	Chief Officer Public Works-Mombasa	3	3	0
9/11/2022	Regional Director's Office-KeNHA	4	4	0
9/11/2022	Deputy Regional Director's Office, KURA	3	3	0
8/11/2022	Kenya Railways-Mombasa Regional Office	7	7	0
25/11/2022	NEMA Offices -Mombasa	3	3	0
7/11/2022	KFS Office -Mombasa	3	3	0
Total		**45**	**42**	**03**

Table E- 7: Mombasa County Public Consultations, Dates and Number of Participants

Date	Venue	Participants	Males	Females
14/11/2022	Jomvu-Miritini	116	60	56
15/11/2022	Mikindani-Birikani	102	77	25
Total		**218**	**137**	**81**

Table E- 8: Kwale county stakeholder consultations venues dates and number of Participants

Date	Venue	Participants	Males	Females
25/10/2022	Chief Officer's Office	5	3	2
25/10/2022	County Commissioner's Office	3	2	1
27/10/2022	Governor's Office	3	2	1
25/10/2022	Department of Water Services	3	2	1
25/10/2022	Department of Environment	3	2	1
25/10/2022	Kwale Water and Sewerage Company	3	3	0
25/10/2022	NEMA-Kwale	4	2	2
26/10/2022	Deputy County Commissioner's Office-Samburu	5	4	1
Total		**29**	**20**	**09**

Table E- 9: Kwale County Public Consultations, Dates and Number of Participants

Date	Venue	Participants	Males	Females
3/11/2022	Mwamdudu-Bonje	96	56	40
Total		**96**	**56**	**40**

Table E- 10: Kilifi County Stakeholder Consultations venues dates and Number of Participants

Date	Venue	Participants	Males	Females
25/11/2022	Kilifi County Governor's Office	4	4	0
3/11/2022	County Commissioner's Office	3	3	0
3/10/2022	DCCs Office Rabai	5	3	2
2/11/2022	Department of Water and Environment	3	3	0
26/10/2022	Department of Lands	3	3	0
26/10/2022	NEMA – Kilifi	3	3	0
7/11/2022	Department of Public Works & Infrastructure	3	3	0
26/10/2022	Kilifi Mariakani Water and Sanitation Company	3	3	0
9/11/2022	KeNHA-Offices	4	4	0
Total		**31**	**29**	**02**

The key issues and concerns emanating from the consultations are highlighted below and were incorporated in the ESIA in relation to mitigation measures.

- Waste management during construction
- Community health and safety during construction and operation
- Noise pollution during construction
- Air emission impacts during construction

- Economic impacts
- Land acquisition impacts
- Influx of workers and associated impacts

Potential Beneficial/Positive Impacts

The proposed project is expected to have a number of beneficial (positive) impacts during the construction and operation phase as shown in the table below.

Table E- 11: Beneficial Impacts

Impact	Description
Improved Access to Clean Drinking Water	With the implementation of the project, the water supply will be clean, stable and reliable hence more customers will be connected to the system.
Employment	The construction of the transmission pipelines including operation and maintenance activities will provide employment opportunities–directly and indirectly–to skilled as well as unskilled work force primarily to local labor including women. The income, thus enhanced, of the local skilled and unskilled work force would also bring out a multiplier effect to other sectors of the economy.
Knowledge/Skills Transfer	Local workers will benefit in terms of knowledge transfer especially from external skilled workers who when paired with the local workers will transfer on-the job skills to them. Further, local workers may undergo certain training as part of skill enhancement prior to employment.
Material Supplies	Another positive impact of the project involves local material sourcing mainly sale of materials for use in the project. Some of these can be expected to be sourced locally and the rest through importation. It is expected that the project will generate new income revenues for the local population across the county in harvesting and transportation of sand, ballast, stones and other construction materials. The new income revenues received will create demand for other goods and services causing a trickledown effect to the entire economy.
Health	A positive induced impact is that improved water and sanitation will lead to less water and insect borne illness leading to a healthier, productive community, whose members will be able to attend school or carry out income earning activities. This also has a positive induced impact by reducing the burden on women and girls, who are often required to look after the ill members of the family or will be the first to miss out if opportunities are limited

Potential Adverse Impacts

The potential negative impacts during construction are generally short-term, temporary and reversible which can be reduced or eliminated by mitigation. Many of the impacts will only occur at active construction stage and mitigation measures have been set out in this report.

Table E- 12: Summary of Negative Impacts

Mwache/ West Mainland Pipelines-Construction Phase				
Issue	**Potential Impact**	**Impact Type and Rating**	**Extent**	**Duration**

Air pollution	Emissions from construction vehicles and equipment.	Direct, Minor	Local	Temporary
Noise pollution	Noise pollution from vehicles and construction equipment may cause nuisances to neighbouring communities.	Direct, Minor	Local	Temporary
Water pollution	Water pollution may result from: i) Accidental spillage of fuels, lubricants and other chemicals. ii) Siltation of water courses from runoff laden with sediment and dust. iii) high suspended solids fromsoil eroded from trenches	Direct, Minor	Local	Temporary
Soil erosion and contamination	Site clearance of vegetation and excavation works using equipment may induce/accelerate soil erosion and siltation of water courses. Contamination may occur as a result of accidental spillage of fuels, lubricant chemicals, sanitary wastewater, etc., as well as from leakage from inadequately protected solid waste storage facilities and sites. Soil may lose its fertility because of removal of topsoil. However, the project sites are in non- agricultural areas (peri-urban) hence soil erosion and implication on agriculture is minor.	Direct, Minor	Local	Temporary
Solid waste generation	Vegetation and soil from excavation, construction waste material and packaging material may produce moderate quantities of waste.	Direct, Minor	Local	Temporary
Impacts on flora and fauna	Removal of vegetation may lead to potential habitat loss of its associated fauna.	Direct, Minor	Local	Temporary
Public health problems	Pools of stagnant water may be a source of water borne diseases especially if trenches are left open (not back filled) over a long period of time.	Direct, Minor	Local	Temporary
Public Safety	Safety problems at the construction sites may arise from excavations, transportation and movement of equipment.	Direct, Minor	Local	Temporary
Visual ammenities	Construction of the units may have a negative impact on aesthetics of the surroundings	Direct, Minor	Local	Temporary
Disturbance and interruption of commercial and social activities	The construction process may cause traffic disruptions and congestion, resulting in temporary disturbance and interruption of commercial and social activities. It may also cause damage to infrastructure (roads, utility lines) and disruption of public services. Compensation for loss of income/business is provided for in the RAP prepared as a separate document.	Direct, Minor	Local	Temporary
Socioeconomic disruption	Construction process may interfere with normal activities of the community in the AoI which may affect their livelihood and incomes.	Direct, Minor	Local	Temporary

Influx of Workers	Influx of people in the area looking for work may cause alteration of culture and introduce behavioural changes.	Direct, Minor	Local	Temporary
Physical and/or Economic displacement of households	Sections of the pipeline route are characterized by encroachments in form of temporary and permanent structures and buildings and shall require to be vacated before commencement of construction work. Loss of business income by traders due to lack of access/closures during construction shall be compensated and has been included in the RAP.	Direct, Moderate	Local	Permanent
Occupational health and safety	Workers may be exposed to occupational health and safety hazards from project activities such as: accidents in excavations for foundations; working with equipment; working under noisy conditions., working in confined spaces; lifting of objects; storage, handling and use of dangerous substances and wastes. Workers may also be potentially exposed to HIV and other sexually transmitted diseases.	Direct, Minor	Local	Temporary
Community Health Safety and Security Impacts	Increased project-related traffic, civil works for site preparation including site 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. The community may also be potentially exposed to STIs/HIV AIDS.	Direct, Major	Local	Long Term
Covid - 19	Spread of COVID -19 amongst workers and the community	Direct, Major	Local	Long term
GBV/SEA/SH	Activities may exercerbate gender based violence, sexual exploitation and abuse and sexual harassment.	Direct, Minor	Local	Temporary
Operation				
Water pollution	Water pollution may occur due to harmful unrequired material getting in contact with treated water.	Direct, Major	Local	Temporary
Noise pollution	Noise generated from vehicles used during maintenance can be a nuisance to sensitive receptors.	Direct, Minor	Local	Temporary
Solid waste generation	Solid wastes may be produced by CWWDA and/or WSP managing the pipeline.	Direct, Minor	Local	Temporary
Local incapacity/ inexperience to manage the pipelines	This will lead to poor operation and maintenance as well as deterioration of infrastructure as well as accidents due to lack of enough technical knowledge on maintenance of residential dwelling units and includes inadequate monitoring of environmental impacts of project activities.	Direct, Minor	Wide	Long term

Waste water generation	Supply of water for domestic use in the West Mainland area via this project will lead to increased generation of waste water at the household level, hence increased waste water in the sewerage system and treatment plant.	Direct, Major	Local	Long term
Water loss	Water loss is common in pipeline projects leading to non revenue water caused by vandalism and or poor maintenance.	Direct,Major	Local	Long term

Table E- 13: Construction and Operation Mitigation Measures

Impact type	Description of mitigation measures
Displacement Impacts (Physical and Economic)	• Develop and implement Resettlement Action Plan to include all category of PAPs (encroachers, land owners) etc and ensure livelihood restoration for encroachers and temporary business owners for the period of time that they are unable to trade due to disruptions caused by the construction activities.
Air pollution	• Develop a Dust Management Plan • 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; • Avoid run off of mud and water and maintain drains in a clean state; • Remove dusty materials form 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 • Undertake watering to attenuate dust near sensitive receptors. The duration and frequency of this shall be set out in the Dust Management Plan and shall consider water availability and any stakeholder grievances

Noise pollution	• Minimise noise according to Kenyan standards and World Bank guidelines. • Control noise and vibration on site. • Work programmes shall be provided to local communities (e.g. through the local radio (FM) stations) and strictly followed. • Maintain vehicle and equipment according to manufacturers' specifications. • 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 shall 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), shall be daytime only; • Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, shall be used, where practicable; • Where practicable, stationary equipment shall be located in an acoustically treated enclosure; • For machines with fitted enclosures, doors and door seals shall be checked to ensure they are in good working order; also, that the doors close properly against the seals; • Throttle settings shall be reduced and equipment and plant turned off, when not being used; • Equipment shall be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers shall also be checked; and fitting of mufflers or silencers of the type recommended by manufacturers.
Water and soil pollution	• No solid waste, fuels or oils shall be discharged into surface water bodies • Vehicles shall preferably be parked on paved platforms. • Fuel storages shall not leak, and shall be periodically monitored, and repaired or replaced when necessary. Maintain fuel and clean vehicles and equipment at workshops/sites with adequate leakage prevention (e.g. impermeable surface, settlers and oil separator).
Soil erosion and contamination	• Remove and store topsoil in separate piles and reinstate after refilling of dug up areas to enable natural re-vegetation. • The Contractor(s) shall present procedures for, and ensure implementation of measures to protect soils from any accidental or structural contamination. These include: • Storing all hazardous, sanitary and cleaning wastes in facilities approved by NEMA. • Installing leak-proof fuel storages on concrete platform with gutters and grease separators, which are monitored periodically and repaired or replaced when required. • Strict enforcement and monitoring standard procedures for storing and handling hazardous wastes and raw material (e.g. fuel or chemicals). • Placing strong drums for oil storage on impermeable floors in the stores. • Parking vehicles on paved platforms whenever possible. • Ensuring that sites for cleaning, fueling and maintaining equipment and vehicles shall be able to prevent leakage (e.g. paved or with settlers). • Isolating contaminated soil and treating /disposing it off in a way that shall depend on the contaminant type.

Solid waste generation	The Contractor shall prepare a Solid Waste Management Plan, which shall contain: ○ An inventory of the types and quantities of waste to be produced. ○ The most appropriate waste management approach for each type of waste including details on (temporary) storage, transport and final destination of the waste. ○ An assessment of any opportunities for reducing solid waste generation, in particular of hazardous and undesirable (persistent and non-reusable) types of wastes. • The Contractor to maintain records of types, quantities, origin, (temporary) storage, transport and elimination/reuse of solid waste, and make these available to the works supervisor upon his request, as proof of proper waste management practices. • Any waste including excess soil shall be disposed of at NEMA gazette sites. • Excavated soils shall be reused as much as possible as filling material and shall be contained after excavation. • Provisional material storage on site shall be designed and undertaken in such a way as to ensure that soils and underground water are not polluted. • Use licensed recycling companies to externally recycle, recover or dispose of waste.
Waste Water generation	• Construct storm water drainages in sections with wash out valves or ensure wash out valves channel flush water into existing storm water drainage systems. • Construct storm water cut-off drains and scour/overflow drains have been provided at the reservoir sites to prevent erosion of embankments and/or to prevent storm water from flooding the site and compromising the infrastructure. • Vehicles shall preferably be packed on paved platforms. • Fuel storages shall not leak, and shall be periodically monitored, and repaired or replaced when necessary. • Sites for cleaning, fueling and maintaining vehicles shall be paved so as to prevent leakage • Vehicles and equipment at workshops/sites shall be regularly maintained, cleaned and fuel leakage shall be avoided through use of impermeable surface, settlers and oil separators. Fuelling and car servicing shall be carried out at designated fuel stations
Impacts on flora and fauna	• Zone out working areas to reduce ecological destruction, • Restore disturbed natural sites through environmental rehabilitation; restoring top soils and (re-)introduce genetic species similar to those destroyed in order to re-establish the natural local ecology.
Public Safety	• Ensure that work sites (especially excavation works), have proper protection with clear marking of safety borders and signage and fence off all dangerous areas. • Inform neighbours about the construction programme in advance and adhere to it. • Confine access to restricted work sites (including those with operation of mechanical and electric equipment) to persons with permits. • Implement appropriate traffic plans with the help of local police when (partial) closure of roads is required.

Public health problems including increased vehicular traffic	• Fill up all depressions to avoid pools of stagnant water may form in pits, holes and excavated ditches which can create suitable habitats for insect disease vectors such as mosquitoes which cause malaria. • Inform local communities about the construction programme in advance. • In case access roads have to be closed, inform local communities and road users in advance. • Use reflective signature to direct traffic to designated areas. • Use flag men/women to give directions to traffic. • Sensitize drivers to observe speed limits
Covid–19	• The Contractor shall develop a Standard Operating Procedures (SOPs) for managing the spread of Covid-19 during project execution and submit them for the approval of the Supervision Engineer and the Client before mobilization. The SOPs shall be in line with the World Bank guidance on COVID-19, Ministry of Health Directives and site-specific project conditions; • Mandatory provision and use of appropriate Personal Protective Equipment (PPE) shall be required for all project personnel including contractors and sub contractors.
Raw material use	• Consider environmental performance of suppliers of raw material in the selection process. • Explore ways of reducing raw material use. • Special emphasis shall be made on raw materials that may be reused and/or recycled/recovered
Occupational health and safety	• Contractor shall develop a Human Resources Policy, which shall 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 shall 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 shall 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 as well as community health and safety. • Contractor shall 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 and self-employed contractors shall assess the H&S risks related with the tasks to be performed during the construction phase. • Pre-employment medical assessments shall 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. • Contractor shall 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 shall 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 shall develop and implement a Workers Grievance Mechanism for the Project workforce including workers and subcontractors.

	• Contractor shall 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 shall ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents. • Contractor shall ensure that 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 shall ensure that adequate clean water, adequate food and access to medical care is provided to all workers on the worksite and at accommodation. • Contractor shall 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, prevention of SEA/SH community education on traffic safety and accident reporting and investigations. • Contractor shall 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.
Disturbance and interruption of commercial and social activities	• Inform local communities about the construction programme in advance and adhere to it. • In case access roads have to be closed, inform local communities in advance. • Clean and maintain access roads in the neighborhood of earth and sand on a daily basis.
Disruption of traffic	• Provide temporary access ways with the approval of local authorities where access roads are closed. • Carry out work under mild weather; avoid strong rains or winds. • Reduce obstruction of access to and use and occupation of roads, footpaths and bridges.
Disruption of social order and prevention of HIV/AIDS and other sexually transmitted diseases	• Sensitize all workers to ensure awareness of and sensitivity to the local cultures, traditions and lifestyles, (to be included in Code of Conduct) • Implement the HIV/AIDS impact mitigation plan that shall involve providing a comprehensive range of services including the identification of possible HIV/AIDS cases, testing with pre- and post-counselling, the treatment of associated infections, referral of appropriate cases, education to promote better quality of life and promotion of precautions, provision of condoms and the application of HIV/AIDS occupational exposure policies.
Protection of Children	• The contractor shall develop and implement a Children Protection Strategy that shall ensures minors are protected against negative impacts associated by the Project including SEA. • All staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behaviour • Children under the age of 18years shall not be hired on site as provided by Child Rights Act (Amendment Bill) 2014
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 shall 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. • 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 shall ensure adequate referral mechanisms are in place if a case of GBV at the community level
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 shall 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 shall include how the project shall 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 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 whistleblower 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.
Visual ammenities	• Do not pile excavated soil to form high stockpiles for long durations; clean up the site upon completion of the work.
Influx/Inmigration	• Develop and implement Labour Influx Management Plan

Environmental and Social Monitoring Plan and Indicators

Project Activity/Aspect	Impact/Effect	Monitoring Indicator	Institutional Responsibility	
			Monitoring Responsibility	Frequency
A. General	**A-1** Planning	• Workforce briefed about the relevant environmental and social issues, including pollution control and site management	CWWDA	Continous
	A-2 Implementation	• EHS Manager • Environmental Officers • Social Officers	CWWDA	Continous

Project Activity/Aspect	Impact/Effect	Monitoring Indicator	Institutional Responsibility	
			Monitoring Responsibility	Frequency
	Oversight Capacity	• Liaison Officers • Health and Safety Officer		
	A-3 Site Implementation Capacity	• Site EHS Officer	Contractor	As per schedule
B. Land Acquisition	**B-1** Land will be used for laying of pipeleines and other activities etc. *(Loss of land and Livelihoods. To be compensated.*	• Development/Disclosure of RAP • Implementation of RAP • Development/Implementation of GRM • Development/Implementation of LRP ○ Landowners informed about compensation package ○ Number of PAPs receiving compensation ○ Number of restored livelihoods ○ Number of PAPs completing Livelihood restoration training courses ○ Number of Grievances received/resolved	CWWDA/NLC	As per RAP Schedule
	B-2 Crop/Plant loss during temporary loss of land	• Use third party independent valuation to define replacement value		• Prior to land acquisition
	B-3 Communication and compensation *(to be communicated during negotiation)*	• Liaison officer to prepare basis of calculation to estimate the rate for different crops and communicate the same to affected PAPs		
	B-4 Damage to community and private/individual property during construction activities	• The grievance redress system shall closely monitor activities for such incidences		
C. Labour Influx	**C-1** Higher rates of violence, injury **C-2** Alcohol and drug consumption and **C-3** Sexually transmitted	Development/Implementation • HR Policy • Labour influx plan Indicators • HR records on the percentage of local versus non-local employment.	HSE Manager Human Resource Manager Contractor/CWWDA	• Prior to construction commencing for Local Content and

Project Activity/Aspect	Impact/Effect	Monitoring Indicator	Institutional Responsibility	
			Monitoring Responsibility	Frequency
	diseases in the local population. **C-4** Social conflicts within and between communities	• Number/attendance records of Sensitization meetings held on GBV, SEA, HIV/AIDS • Review of training attendance records of capacity enhancement and transfer of knowledge that local personnel have received. • Code of conduct included in contracts • % of local workers recruited		Procurement Plan. • Continuous during construction phase for employment and procurement-related measures. • Quarterly for training-related measures.
D. Air Quality/ Atmospheric Conditions	**D-1** Dust Emissions associated with construction activities	-Record of repairs -Fuels and lubricants conforming to specifications -PPEs Distribution list/stores, percentage of workers using nose and ear masks • Complaints registered over dust nuisance • Site conditions (from visual inspections)	Contractor/HSE	• Weekly throughout the construction phase
E. Noise	**E-1** Noise from construction activities (*to be managed by equipment choice and arrangement of construction activities)*	• Complaints registered over noise nuisance -Noise making machines/equipment fitted with mufflers -Record of noise measurements -Record of vehicle and equipment maintenance PPEs Distribution list/stores, percentage of workers using ear plugs.	Contractor	• Daily in construction sites close to sensitive receptors
F. Soils	**F-1** Dumping of construction material outside the project construction footprint **F-2** Erosion and compaction **F-3** Contamination due to spill of civil	• Visual checks at construction site • Visual inspection during casting • Stockpiles of topsoil • Written down soil protection measures and record of implementation • Monitoring reports on parking of vehicles and status of fuel storages	Contractor	• At least once per construction site

Project Activity/Aspect	Impact/Effect	Monitoring Indicator	Institutional Responsibility	
			Monitoring Responsibility	Frequency
	construction material			
G. Ecology	**G-1** Disruption to existing flora and fauna **G-2** Loss of Vegetation **G-3** Disturbance to fauna due to movement in forest areas	• Sensitization trainings to worker on local ecology and extent of care • Number of revegetated areas. • Percentage area of site cleared vs. remaining un-cleared land • Disturbed sites restored after well completion	Contractor	• Continuous
H. Waste	**H-1** Accumulation of waste on site causing nuisances such as odor, pest control problems and general litter.	• Construction Waste Management Plan • Written down Solid Waste Management Plan (SWMP) and implementation schedule • Records of types of wastes generated, transport and delivery to designated disposal sites • Routine weekly checks of waste management arrangements shall be undertaken • Status of housekeeping on site • Waste tracking records • Agreement/contracts with licensed waste handling agencies.	Contractor	• Continuous
I. Traffic and Transport	Increase in traffic	• Development/implementation of traffic management plan • Number of traffic incidents recorded • -Demarcated work sites and signals • Security guards to restrict access • Sensitization reports	Contractor	• Continuous
J. Landscape and Visual Ammenities	**K-1** Visual scarring of the landscape	Disturbed sites restored after well completion	Contractor	Continuous throughout the construction phase
K. Workers Heath, Safety and Labour Rights	Workers health and safety Respect for labour rights	• Worker Health and Safety Management System in place • Human Resources Policy • Traffic Management Plan • Verify contractual clauses of Contractor and all sub-contractors requiring adherence to Kenya law and international standards.	Contractor	• Continuous

Project Activity/Aspect	Impact/Effect	Monitoring Indicator	Institutional Responsibility	
			Monitoring Responsibility	Frequency
		• Records of incidents and accidents • Record on training sessions and attendance on health and safety measures • Record of lessons learned to minimize occupational health and safety • Code of Conduct document • Availability of protective wear, e.g., Gloves, overalls, masks, helmets etc.		
L. Community Impacts	**L-1** Labour Influx *(Health impacts including risks of STDs, HIV/AIDS)* **L-2** Community expectation for local benefits	• Number of meetings held • Attendance records of sensitization meetings held on GBV, SEA, HIV/AIDS • HR records on the percentage of local versus non-local employment • Code of conduct included in contracts	Contractor	Continuous throughout the construction phase
	L-3 Violence against Children	• Policies against VAC in place • HR Policy • Records of employees with National ID card indicated and capture chronological age. • Cases received, resolved with time allotted, referred out, escalated, etc.	Contractor	
	L-4 Gender Based Violence and Domestic Violence	• Policies against GBV in place • HR Policy • Attendance records of Sensitization meetings held on GBV • Presence of a dedicated GRM for uptake of complaints/ Grieviances • Cases received, resolved with time allotted, referred out, escalated, etc.	Contractor Local CBO/NGO	Continuous throughout the construction phase
M. Cultural Heritage	**M-1** Cultural and religious sensitivities maybe impacted by project	• Chance find procedure • Records of training on chance find procedures	Contractor	Continuous throughout the construction phase
N. Local amenities and infrastructure	**N-1** Pressure to local infrastructure from use of local resources	• Grievance redress process shall closely monitor construction activities for such incidences	CWWDA Liaison Officer Contractor Local representative	Continuous throughout the construction phase

Environmental and Social Management and Monitoring Plan

The ESIA includes an ESMP which details the mitigation measures, environmental monitoring activities and indicators, institutional responsibilities, and environmental management capacity building. During construction, the Project Supervising Engineer (PSE) shall closely monitor the works contractors' environmental and social performance and overall ESMP implementation using the C-ESMP to be prepared by Contractor and approved by the Supervising Engineer. The estimated cost of construction phase ESMP is KES 5,020,000. The costs are modest in view of the fact that only at the point of developing the management plans by the contractor will actual costs be accurately determined.

Construction Environment and Social Management Plan

Construction Environment and Social Management Plan (C-ESMP) is an upgraded ESMP illustrating realities of the project works to be prepared by the Contractor. The Contractor is expected to finalize the work plan and upon approval, list the works items and for each item present practical actions that shall be undertaken to realize achievement of the ESMP. The actions on works items shall address environmental and social aspects associated with the works and in line with guidelines from the ESMP. Based on this ESMP outline, the Contractor shall be instructed to develop a C-ESMP and submit to CWWDA, Project Supervision Consultant/Engineer for approval.

Project Management Unit

The project implementation arrangements have been established under the CWWDA. The core functions of the CWWDA in the West Mainland pipelines Project Management Unit (PMU) shall be to coordinate and facilitate fiduciary oversight, environmental and social safeguards supervision among others. The PMU has qualified environmental and social safeguards specialists who shall provide safeguards support on the implementation of the Mwache/West Mainland pipelines Project to ensure compliance and support corrective action.

Project Supervision Engineer

The Project Supervision Engineer with a qualified Environmentalist and Social Expert shall be charged with the responsibilities of supervision, review of site reports, preparation of monthly progress reports, prepare and issue appropriate instructions to the Contractor and monitor ESMP implementation. To achieve this, the Consultant team shall comprise the following professional key staff cadres;

a) Environmentalist Specialist (1No.)
b) Sociologist (1No.)
c) Community Liason Officer (1 No)

Contractor

The Contractor shall ensure that the established safeguards are integrated and implemented throughout the project works as per the C-ESMP. The Contractor shall internalize the ESMP/C-ESMP, prepare monthly progress reports and implement instructions issued by

the Supervision Consultant. The Contractor shall also undertake ESIA studies for sites outside the project zone and seek appropriate NEMA licenses. The Contractor, therefore, shall engage qualified Environmentalist and Social Experts on full time basis to interpret the C-ESMP and advice on the implementation of the same, as well to the Counterpart Personnel for the Supervision Expert. The full Contractor's team shall comprise of key staff cadres as shall be specified in the Bidding Document. An environmental and social completion audit report shall be prepared by the contractor at the completion of the construction of the project before hand over which will ascertain the extent to which the contractor complied with the ESMP/C-ESMP and that no environmental and social liabilities are existing prior to handover. The PIU shall prepare an environmental and social audit in the first year of operation in accordance with the Environmental Audit regulations of Kenya. Contractor shall not access the sites and take possession until PAPs are compensated as per the RAP. Further, any displacement/disturbance or destruction of property by contractor outside of the transmission line corridor shall be compensated by contractor (at contractors) cost.

Grievance Redress

Grievance redress is a critical component of effective ESMP implementation. The purpose of GRM is to provide a forum to the internal and external stakeholders to voice their concerns, queries and issues with the project. Such a mechanism would provide the stakeholders with one project personnel or one channel through which their queries shall be channeled and will ensure timely responses to each query. This will allow for trust to be built amongst the stakeholders and prevent the culmination of small issues into major community unrest. The GRM shall be accessible and understandable for all stakeholders in the project and for the entire project life. The GRM shall be communicated to all relevant stakeholders and will also be applicable for any contractor that shall occupy and/or use land during the construction and operations phase. World Bank Group (WBG) standards require Grievance Mechanisms to provide a structured way of receiving and resolving grievances. Complaints shall be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities, and is at no cost and without retribution. The mechanism shall be appropriate to the scale of impacts and risks presented by a project and beneficial for both the company and stakeholders. The mechanism must not impede access to other judicial or administrative remedies. The GRM will be vital in addressing grievances between the contractor and the local communities (external) that are related to environmental and social aspects of the project including health and safety. There shall also be a separate GRM established by the contractor to address grievances between the workers and the contractor.

1 INTRODUCTION

1.1 Project Background

The proposed construction of the Mwache/West Mainland and Changamwe Pipeline (the "Project") is to be financed under the Water and Sanitation Development Project (WSDP, P156634) which is a World Bank project. The Project Development Objective (PDO) of WSDP is to improve water supply and sanitation services in select coastal and north-eastern regions in Kenya. This project has four components;

1. The first component, Rehabilitation and expansion of urban water supply and sanitation services in the coastal region, has the following subcomponents: (i) Support to coastal counties; and (ii) Support to the coast bulk water services providers.
2. The second component, Expansion of water supply and sanitation services in underserved northeastern counties, aims to finance a program of activities designed to improve water supply and sanitation services in the northeastern counties, such as Wajir town in Wajir County and the Dadaab refugee camp host communities in Garissa County.
3. The third component, National performance-based financing, has the following two subcomponents: (i) Support for water and sanitation infrastructure investments and services; and (ii) Technical assistance for national performance-based financing.
4. The fourth component, Project management, finance a program of activities designed to strengthen the capacity of the recipient for project management, implementation and coordination, and Monitoring and Evaluation (M and E).

The **Mwache/West Mainland Transmission Pipeline** falls under the first component of the WSDP. This Environmental and Social Impact Assessment (ESIA) report was developed for the Mwache/West Mainland and Chamgamwe Pipeline Project's construction and operation. The project entails the construction of a water transmission pipeline that will link the proposed West Mainland Reservoir of 14,000m^3 capacity in Kwale County to the West Mainland service area in Mombasa County.

1.2 Project Proponent

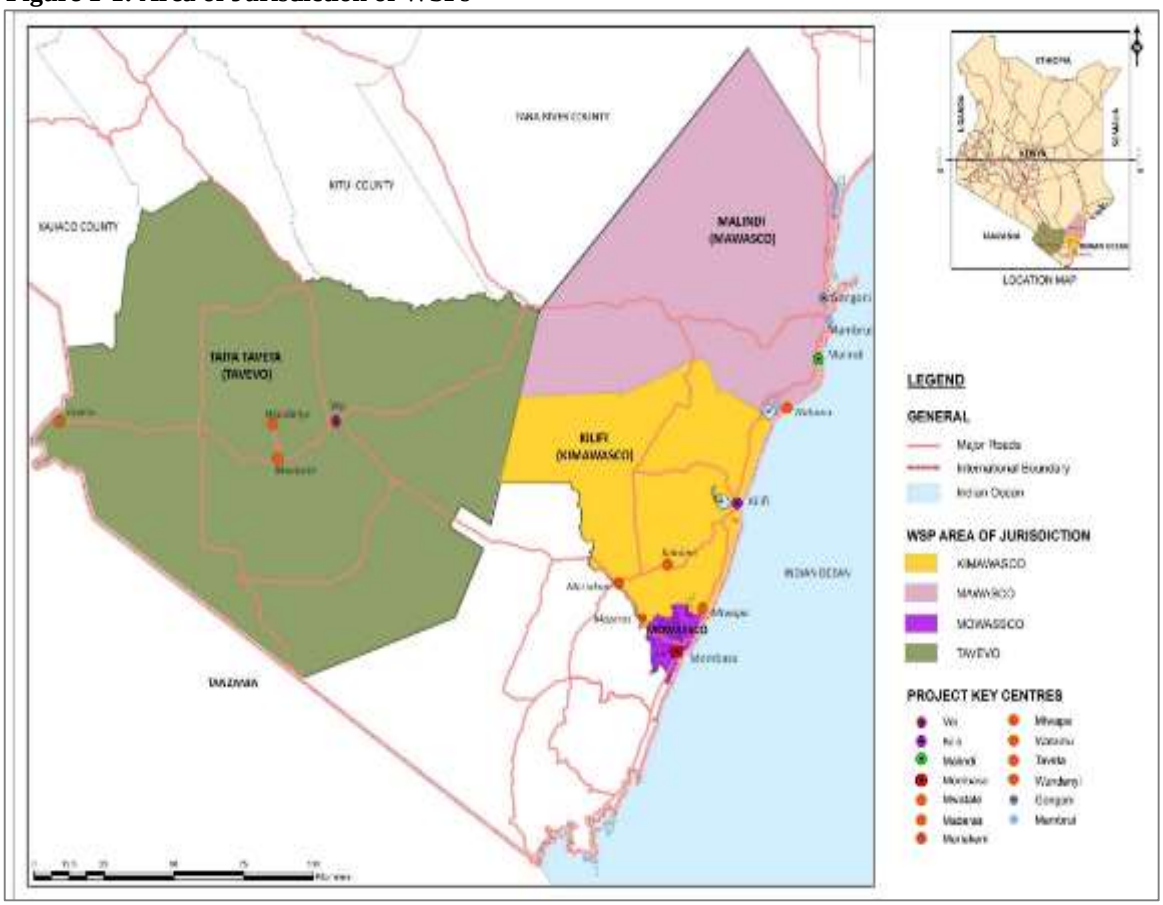
CWWDA, formerly known as CWSB under the Water Act 2002, is one of the Nine Water Works Development Agencies in Kenya, constituted under provision of the Water Act 2016. CWWDA ensures provision of quality and affordable water and sewerage services in its area of jurisdiction within Mombasa, Kilifi, Kwale, Lamu, Taita Taveta and Tana River Counties through its appointed Water Services Providers (WSPs). Under the Water Act 2016, CWWDA is bestowed the responsibility of developing sources and infrastructure for bulk water supply to the above Counties. CWWDA is the Implementing Agency for the Mwache Water Transmission Pipelines and terminal reservoirs project. MOWASSCO is the WSP for Mombasa City.

Table 1-1: List of WSPs in CWWDA Areas of Jurisdiction

S/NO	Water Servce Provider	Area of Service/County
1	Mombasa Water Supply & Sanitation Company	Mombasa (Island, West Mainland, South Mainland, North Mainland)-Mombasa County
2	Malindi Water & Sewerage Co	Malindi town and its environs-Kilifi County
3	Kilifi-Mariakani Water & Sewerage Co (KIMAWASCO).	Kilifi, Mariakani, Mtwapa and environs of Kilifi County
4	Kwale Water & Sewerage Co	Kwale, Ukunda, Diani and environs-Kwale County
5	Lamu Water & Sewerage Co.	Lamu County: Lamu Island , mainland and environs
6	Tana River Water & Sewerage Co	Hola, Bura, Garsen and environs-Tana River County
7	TAVEVO Water & Sewerage Co	Voi, Taveta, Wundanyi and environs-Taita Taveta County

The **Figure 1-1** below shows the area of jurisdication of four WSPs.

Figure 1-1: Area of Jurisdiction of WSPs



1.3 Purpose and Justification of the Project

1.3.1 Existing Bulk Water Supply System

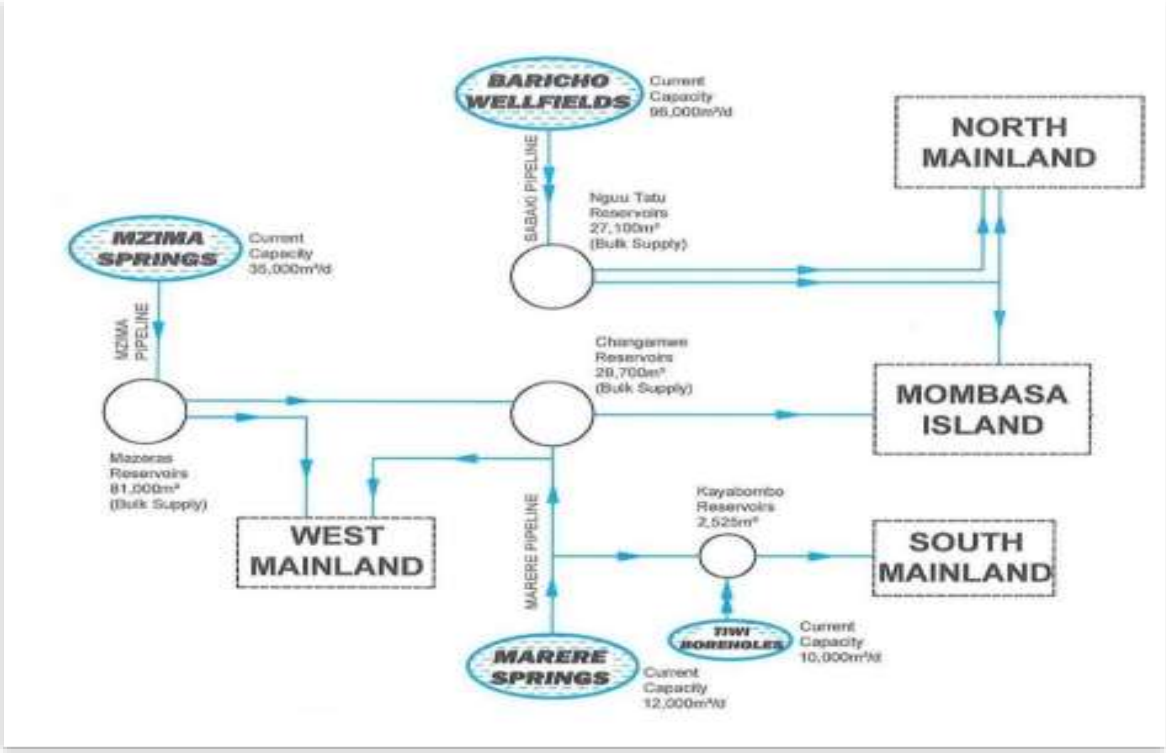
At present, Mombasa City is served by the following bulk water sources, which also supply other towns in the neighbouring counties; data based on the Mombasa Water Distribution Network Master Plan (MIBP & Nippon Koei, 2017):

Box 1-1: Mombasa County Bulk Water Sources

1.Baricho wellfield: capacity is estimated at 96,000 m3/d, supply to Mombasa is 27,000 m3/d
2. Mzima springs: capacity is estimated at 35,000 m3/d, supply to Mombasa is 15,000 m3/d
3. Marere springs: capacity is estimated at 12,000 m3/d, supply to Mombasa is 2,500 m3/d
4. Tiwi Wellfield: capacity is estimated at 10,000 m3/d, supply

Figure 1-2 below shows the schematic diagram of the existing bulk water supply system serving MOWASSCO and KIMAWASCO area of jurisdiction.

Figure 1-2: Schematic Diagram of Existing Bulk Water Supply



The total average current supply to Mombasa County is approximately 46,500 m^3/d. Updated water demand projections prepared and presented in the data review report (ARTELIA/MIBP July 2021) indicated a current (Year 2020) water demand of 194,699 m3/day, projected to increase to 317,534 m^3/day in year 2035. The updated population and corresponding potable water demands largely corelate with the Projected Water Demands under the Water Supply Master Plan (Tahal, 2013).

1.3.2 Existing Water Distribution Systems Supply

The West Mainland service area is mainly supplied from the Mzima system via the Mazeras reservoirs (81,000 m^3) located within Mazeras Town, along the Nairobi-Mombasa Highway. The Mazeras reservoirs are located at an elevation of 160 masl. The full storage capacity of the Mazeras reservoirs is not available due to the dilapidated condition of one of the reservoirs. Some parts of the West Mainland service area are supplied by off-takes from the Marere Pipeline whose source is the Marere springs. To bridge the huge deficit in water supply, and to meet future projected water demands of Mombasa County, the Ministry of Water and Sanitation and Irrigation (MWSI) commenced planning for new projects in the early 2010's. Among the projects proposed under the recent studies is the Mwache Dam Water Supply Project, to be implemented in the priority stages, amongst other projects to be implemented in later stages. The Mwache Dam Water Supply Project entails the construction of:

1. 84m RCC Dam on Mwache River, crest length 526 m
2. 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
3. 4Nr. Terminal Reservoirs; one for each of the target supply areas (NML, WML, SML and Island); namely
    - 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 around 100 masl on a site within the West Mainland, to serve the West Mainland area
4. A system of treated water transmission pipelines, transmitting treated water from the Mwache WTP to the proposed reservoirs.

The MWSI has secured funds from the World Bank and the AFD, for financing implementation of the various component of the Mwache Dam Water Supply Project, with CWWDA being the implementing agency. A schematic diagram showing the proposed project components of the Mwache Dam Water Supply System and their respective financing agencies is given in **Figure 1-3** below

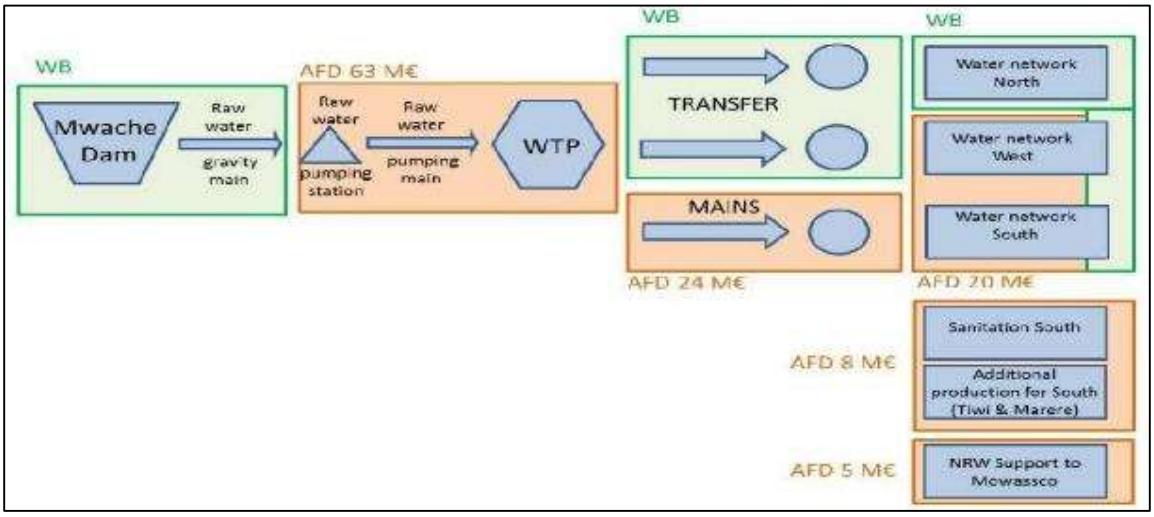


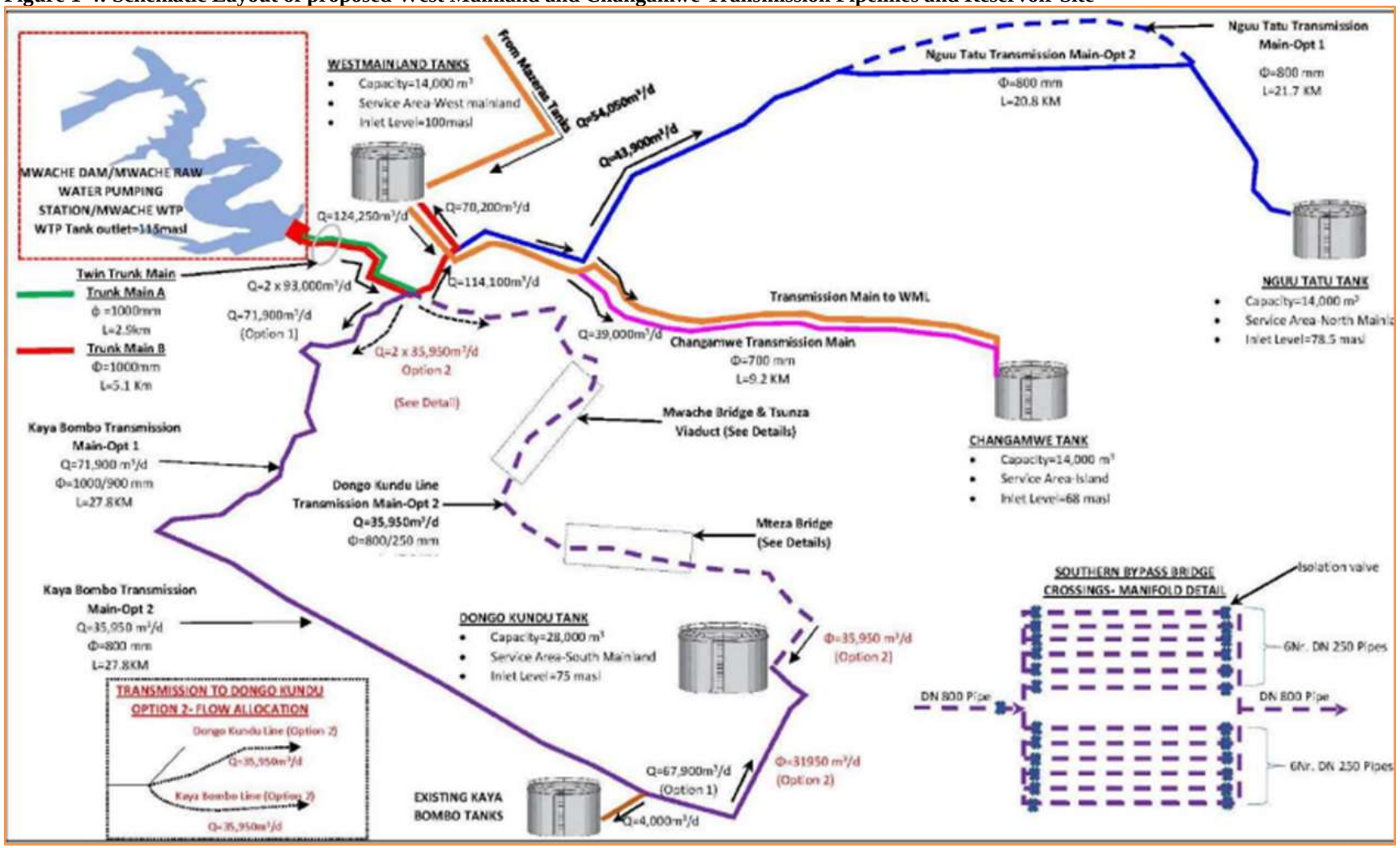
Figure 1-3: Components of the Mwache Dam Project and respective Financing Agencies

The overall Mwache Dam Project as planned, 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.

- West Mainland Reservoir at 100 masl inlet level, supplying the Mombasa West Mainland service area.
- Changamwe Reservoir at 62.5 masl inlet level, supplying the Mombasa Island service area.
- Nguu Tatu Reservoir at 71.5 masl inlet level, supplying the Mombasa North Mainland service area.
- Dongo Kundu Reservoir at 75 masl inlet level, supplying the Mombasa South Mainland service area.

The Mwache water transmission pipelines are proposed to transmit treated water from the proposed Mwache Water Treatment Plant (WTP) Clear Water Tank Outlet to the terminal reservoirs serving the respective demand areas in Mombasa North Mainland, Mombasa Island, Mombasa West Mainland, and Mombasa South Mainland. The proposed outlet level at the Clear Water Tank is 115 masl, to ensure economic sizing for gravity transmission to all target service areas while maintaining adequate residual pressures. The water transmission Pipelines will transmit treated water from the WTP to the reservoirs mentioned above. A layout of the proposed Mwache Water Transmission Pipelines Project is given in **Figure 1-4 below** which shows the route alignment of the West Mainland and Chamgamwe transmission pipeline. The yellow line indicates the section of the pipeline from the proposed new Bonje reservoir to west mainland, and the pink line is the express line from the Bonje reservoir to Changamwe (island allocation). The blue line indicates the trunk main from the WTP to the bonje reservoir other transmission mains (North Mainland) which are outside of the scope of the ESIA. The purple line is the South Mainland pipeline also outside of the scope of this ESIA. The red and green line are trunk mains from WTP to the Bonje reservoir which are outside of the scope of the ESIA.

Figure 1-4: Schematic Layout of proposed West Mainland and Changamwe Transmission Pipelines and Reservoir Site



1.4 Objectives of the Mwache/West Mainland Project

The main objectives of the Mwache/West Mainland Water supply project are:

1) To improve water supply and sanitation services in the sub counties of Jomvu and Mikindani (Mombasa), Rabai (Kilifi) and Kinango (Kwale) areas.
2) To establish a results-based financing mechanism, and
3) To improve services by strengthening institutional capacity.

1.5 Justification for ESIA

World Bank Operational Policies OP 4.01 on Environmental Assessment, together with the Government of Kenya's Environmental Management and Coordination Act (EMCA 1999) and Environmental Management and Coordination (amendment) Act 2015 were the guiding principles for the ESIA. The objective of EMCA 1999 and amendment in 2015 and OP 4.01 is to ensure that projects financed by Kenya Government funds are environmentally and socially sustainable without adverse impacts to the environment. The objective of OP 4.01 is to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely social and environmental impacts. This policy is triggered if a project is likely to have potential (adverse) environmental and social risks and impacts on its area of influence. OP 4.01 covers impacts on the natural environment (air, water and land, human health, and safety; physical cultural resources; and transboundary and global environment concerns.

World Bank's Operational Policy OP 4.12 on Involuntary Resettlement shall be the guiding principle for the development of the Resettlement Action Plan (RAP). It is envisaged that activities proposed under the program, specifically shall trigger land acquisition for the wayleave. It is expected that land, permanent and temporary structures, trees, and crops as well as the livelihoods of the project-affected communities shall be affected hence the need for a RAP.

1.6 Objective and Scope of ESIA

The purpose of this study was to undertake an Environmental and Social Impact Assessment study for the Mwache/West Mainland and Changamwe transmission line. The ESIA study has been developed in compliance with the Environmental Impact Assessment/Audit Regulation, 2003 and relevant World Bank (WB) environmental and social safeguard policies with emphasis on O.P 4.01. The purpose of an EIA is to provide information to regulators, the public and other stakeholders to aid the decision-making process. The objectives of an EIA are to:

- Define the scope of the project and the potential interactions of project activities with the environment (natural and social).
- Identify relevant national and international legislation, standards and guidelines and to ensure that they are considered at all stages of project development.
- Provide a description of the proposed project activities and the existing environmental and social conditions that the project activities may interact with.
- Predict, describe and assess impacts that may result from project activities and identify mitigation measures and management actions to avoid, reduce, remedy or

compensate for significant adverse effects and, where practicable, to maximize potential positive impacts and opportunities.

- Provide a plan for implementation of mitigation measures and management of residual impacts as well as methods for monitoring the effectiveness of the plan.

1.7 Project Categorisation

An essential element of the ESIA is environmental scoping which was undertaken in accordance with World Bank safeguards policies specifically OP. 4.01 and Kenya's environmental laws. It should be emphasized that much of the work initiated in the environmental scoping process continues as a logical set of steps merging into the ESIA process. The background data collected, reviews conducted, draft reports, plans, and assessment of risks looked at during scoping are simply moved to a higher level of environmental assessment with emphasis on risk aversion and adaptation strategies during project implementation. World Bank Operation Policy 4.01, Clause 8 Environmental Screening, sets out the criteria categorizing projects into one of four categories based on type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts. There are as set out below:

Table 1-2: World Bank Project Categories

Project Categories
Category A: A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. EA for a Category A project examines the project's potential negative and positive environmental impacts compares them with those of feasible alternatives (including the without project situation), and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance. For a Category A project, the borrower is responsible for preparing a report, normally an EIA (or a suitably comprehensive regional or sectoral EA) that includes, as necessary, elements of the other instruments referred to in para. 7.
Category B: A proposed project is classified as Category B if its potentially adverse environmental impacts on human populations or environmentally important areas including wetlands, forests, grasslands, and other natural habitats are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases, mitigatory measures can be designed more readily than for Category A projects. The scope of EA for a Category B project may vary from project to project, but it is narrower than that of Category A EA. Like Category A EA, it examines the project's potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance. The findings and results of Category B EA are described in the project documentation (Project Appraisal Document and Project Information Document).
Category C: A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required for a Category C project.
Category FI: A proposed project is classified as Category FI if it involves an investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts.

Source: World Bank OP 4.01: Environmental Assessment

An Environmental and Social Management Framework (ESMF) was prepared for the Water Sanitation Development Project (WSDP) with the overall project classified as a Category B Project. The Mwache/West Mainland and Changamwe Pipeline does not pose significant environmental and social challenges and is hence considered a Category B project as the impacts associated with the works are likely to be site-specific (localized),

short term in nature, not unprecedented (normal construction impacts) not located in a sensitive environment, generally reversible, and in most cases, mitigation measures can be designed to manage the negative effects.

1.8 Report Structure

In order to provide clear presentation of the ESIA procedures including their results, conclusions and recommendations, this report is structured as follows:

1. **Chapter 1. Introduction** (this chapter). The chapter introduces the Project by providing details of its location, scope, owner and developer.
2. **Chapter 2. ESIA Approach and Methodology**. This chapter provides an overview of the overall process of environmental and social impact assessment and applicability of the international methodology for the ESIA procedure. The chapter further addresses: definitions of key terms; identification of potential environmental and social impacts (through consultation and scoping process); description of the criteria used to determine the significance of impacts for various environmental and social topics; and how mitigation measures are considered within the assessment process.
3. **Chapter 3. Project Description.** This chapter describes the background and phasing of the Project, including descriptions of the main and auxiliary facilities, infrastructure, associated facilities, as well as definition of the Project boundaries in the form of the Project area of influence. Tentative project implementation timeline is provided.
4. **Chapter 4. Policy Legal and Institutional Framework.** This chapter provides an overview of the national and international legal framework, within which the Project is to be developed and implemented. Environmental and social legal requirements of the Republic of Kenya is considered together with the applicable international Lender requirements and guidelines.
5. **Chapter 5. Environmental and Socio-Economic Baseline Conditions.** The existing environmental and socio-economic baseline is described and characterized in this chapter.
6. **Chapter 6. Stakeholder Consultations**. This chapter describes the stakeholder engagement process adopted by the Project. It describes the results of consultation activities undertaken earlier and as part of the ESIA process. It also provides stakeholder identification.
7. **Chapter 7. Analysis of Project Alternatives.** The key process solutions are presented as they are seen at the current stage of planning, alongside with considered alternatives and justification of the preferred alternative.
8. **Chapter 8. Assessment of Potential Risks and Impacts**. This chapter presents the assessment of potential environmental and socio-economic impacts, including identification of mitigation measures and monitoring requirements. Impacts of the Project are assessed for each component of the environment. Impacts during the Project implementation are assessed on a topic-by-topic basis. This chapter addresses potential cumulative impacts of the Project and other third-party economic activities in the region.
9. **Chapter 9. Environmental and Social Management.** This chapter describes the approaches to environmental and social management across all Project activities

and recommends the management procedures and plans to be adopted to ensure compliance with the applicable international requirements throughout the life of the Project.

10. **Chapter 10. Grievance Management**
11. **Chapter 11. Conclusion** provides summary of the key significant impacts, mitigations and monitoring, as well as recommendations for further studies to remove uncertainties.

2 ESIA APPROACH AND METHODOLOGY

This chapter provides a structured description of the ESIA approach and methodology used including:

- Main stages of ESIA process
- ESIA scoping
- Baseline studies
- Impact identification and evaluation of significance; and
- Mitigation measures.

2.1 ESIA Study Team Members

Table 2-1 below shows the team of experts that were involved in undertaking the ESIA study.

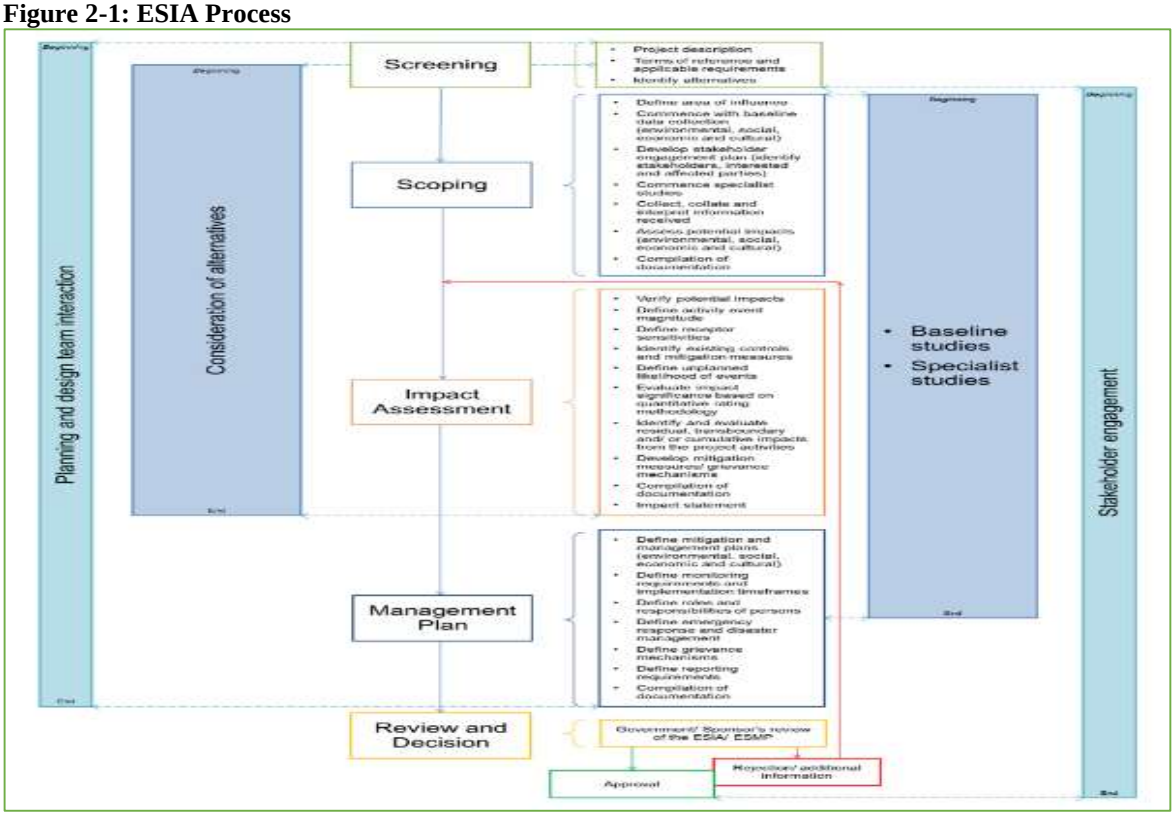
Table 2-1: ESIA Team

Name	Position
Tito Kodiaga	Overall Team Leader
Dorothy Mbuvi	Social Specialist
Godwin Sakwa	ESIA Team Leader
Aggrey Adimo	Ecologist

2.2 ESIA Process

To ensure a robust and comprehensive impact assessment, the ESIA process was structured around a series of progressive and iterative stages (Figure 2-1). Stakeholders, entities and individuals responsible for development/implementation of the Project design, the ESIA team provided inputs to these stages. Public engagement was maintained at all stages of the ESIA process. This ESIA covers all required stages: from scoping, stakeholder identification and consultations, review of alternatives, identification and assessment of benefits and adverse impacts of the Project, to development of mitigation and remediation measures, and proposals for the control and monitoring to be undertaken.

Figure 2-1: ESIA Process



2.3 ESIA Overall Approach

The CWWDA through the ESIA Terms of Reference (ToR) has set out in significant detail the requirements towards delivering a comprehensive identification and analysis of environmental and social impacts as a result of the project and recommended mitigation measures. The generic steps outlined by CWWDA, also compliant with World Bank safeguards policies, per the ToR are as follows:

- Project description and institutional framework
- Scoping study
- Environmental baseline study
- Socioeconomic baseline study
- Assessment of social and environmental impacts at different stages of project (pre-construction, during construction, operation and maintenance
- Identification and development of mitigation measures
- Identification and development of sustainable development approaches; and
- Environmental and Social Management Plan

The requirements of NEMA are stated in the Environmental Management and Coordination Act, 1999 (Section 2.3.1) and EIA/EA Regulations 2003 and as amended in 2015. The study followed a typical ESIA process as set out in this section. It follows a typical process of establishing the current baseline conditions, identifying specific environmental and social risks that need to be addressed, characterization of the effects the project will have and the impacts (positive or negative) they will result in, determination of significance of the issues identified, establishment of mitigation measures and monitoring measures, and finally proposals for management plans to ensure effective

implementation of mitigation and management of the anticipated issues. The approach and methodology chosen ensures that World Bank safeguard policies, the Kenyan ESIA processes have been followed. This involved collecting data on the environmental and social situation, conducting consultations with stakeholders and data analysis.

2.4 ESIA Scoping

An essential element of the ESIA is the environmental scoping study which was undertaken in accordance with World Bank OP. 4.01 and the EIA/EA NEMA regulations. Scoping is the process of determining the content and extent of the matters that should be covered in the ESIA and associated documentation as well as identifying methods for assessment of impacts. The scoping process is intended to identify the types of the environmental and social impacts to be examined and documented by the ESIA, considering the most significant potential aspects and risks. The main objectives at the scoping stage are:

- Preliminary review (screening) of documents provided by the client regarding proposed operations and potential alternatives;
- Collection and high-level analysis of the available information of the environmental and social conditions at the Project site and wider area, and identification of the most sensitive (vulnerable) receptors;
- Identification of the applicable local and international requirements and standards;
- Identification of similar projects for benchmarking of the proposed operations;
- Preliminary identification of stakeholders and initial consultations with them; and
- Initial identification of the Project impacts.

It should be emphasized that much of the work initiated in the environmental scoping process continues as a logical set of steps merging into the ESIA process. The background data collected, reviews conducted, draft reports, plans, assessment of risks looked at during scoping are simply moved to a higher level of environmental assessment with emphasis on risk aversion and adaptation strategies during project implementation. The multiple benefits from environmental scoping include, among others:

- Helping to provide environmental information about important effects of the project, including issues of particular concern to affected groups and individuals;
- Stimulating early discussion among the developer, environmental authorities, other interested parties and the public about the project and its environmental impacts;
- Making planning, management and assessment of resources required for the project more efficient and based on environmental studies;
- Identifying legislation or regulatory controls which may be relevant to the project and provide opportunities for the assessment of different management and control systems to be undertaken in parallel with the implementation; and
- Providing NEMA with information on proposed projects that may or may not infringe environmental regulations.
- Identification of social, gender and health issues and potential beneficial and adverse environmental impacts related to proposed project activities, social and economic assessments during scoping were based on preliminary screening and public consultations;
- Review of existing studies, environmental legislation, environmental and social

quantitative and qualitative surveys and studies, including gender analysis and technical documents related to the sector;

- A preliminary assessment was undertaken of the legal and institutional framework as well as NEMA processing procedures to assist CWWDA to obtain the necessary approvals and licenses required for project advancement;
- Using a screening tool, the ESIA team carried out field observations to identify potential beneficial and adverse environmental and social impacts associated with the anticipated scope of engineering works, land acquisition and resettlement; sensitive ecological habitats; impacts on women and vulnerable groups; worker safety; and health issues;
- Lastly, the scoping exercise attempted to determine the significant environmental and socio-cultural issues that should be the focus of the ESIA, including potential beneficial and adverse impacts associated with several key issues, such as gender; land acquisition and resettlement; sensitive ecological habitats; impacts on women and vulnerable groups; air and noise quality impacts, community health and safety, worker safety and health issues.

2.5 NEMA Requirement for Scoping

Current Kenyan environmental and social legislation requires the preparation of Terms of Reference (ToR) which must be submitted to NEMA for approval prior to commencing the ESIA study as part of the scoping phase. The NEMA EIA/EA regulatory procedures specify that the aims of scoping are to:

1. Review all applicable laws, policies and planning documents which relate to the type of project or areas in which it is to be located.
2. Review all international obligations that Kenya is signatory to and which may be affected by the proposed development.
3. Identify the relevant environmental standards to be applied in the design of the project or sub-projects.
4. Identify all possible alternatives which may relate to route, site, layout, design, technology, etc.
5. Conduct an alternatives assessment to determine the preferred environmental options.
   Identify the key impacts associated with the preferred option (s) and determine in consultation with NEMA and the developer, special studies that may need to be undertaken.

2.6 Literature Review

This included studying relevant legislation and policies; national, regional, provincial and local secondary (collated) data sources; available maps of the Projects area; county development strategic documents and national programs; and other related reports and documents related to CWWDA and World Bank safeguard policies on ESIA and associated guidelines. Key documents reviewed included among others: -

- Project Detailed Design Report
- The Constitution of Kenya (2010)
- Environmental Management and Coordination Act 1999
- Environmental Management and Coordination (Amendment) Act 2015

- Environmental (Impact Assessment and Audit) Regulations, 2003
- Environmental Management and Co-ordination (Water Quality) Regulations 2006
- Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009
- Environmental Management and Co-ordination (Waste Management) Regulations 2006
- Environmental Management and Coordination (Air Quality) Regulations, 2014
- Physical and Land Use Planning Act 2019
- The Public Health Act (Cap 242)
- Occupational Safety and Health Act (OSHA), 2007
- The Factories and Other Places of Work (Noise Prevention and Control) Rules 2005
- Water Act 2016
- World Bank relevant safeguard policies
- WSDP ESMF

2.7 Baseline Studies

Baseline studies are primarily undertaken at two key stages, i.e. scoping and impact assessment. However, as shown in Figure 2-1, they are an ongoing activity throughout the ESIA Process. During scoping work, relatively 'high-level' baseline data are required to assist identification of likely gaps and key impacts to be considered in more detail at later stages. Where gaps are identified between available baseline data and data required for the ESIA at the scoping stage, then additional surveys or studies are undertaken to collect the required data. The work included desk-based studies and the site visit conducted by environmental and social teams of EMC Consultants.

Field site visist were undertaken during the period between October-November 2022 and include transect walks along the project route to collect baseline bio-physical and socio-economic characteristics of the project area. Photographic capture was also undertaken. Ambient air and noise measurements were conducted targeting sensitive receptors and questionnaires were administered to the communities along the pipeline route to collect primary socio-economic baseline information. The questionnaire targeted 100% of the PAPs in the ROW, 100% of PAPs identified as key receptors, while other key stakeholders were purposively identified and consulted using Key Informant Interviews (KIIs). Public meetings (Barazas) were held in locations agreed upon by the national and county government administration and aimed at targeting those that may be in the project area but not directly affected by the project.

It is important to ensure that receptors are identified and analysed, and their sensitivity is determined during scoping and baseline studies. Receptors are environmental and social components that may be affected, adversely or beneficially by the proposed operations. Three high-level categories of receptors can be identified:

- Physical environment (such as air quality, water bodies, landscapes, terrestrial soils, marine sediments, etc.)
- Biodiversity and biological resources (such as habitats, species and ecosystem services, for example, flood protection provided by nearby wetlands); and

- Social (such as residents of local communities, businesses, land and other resource users, cultural heritage resources).

2.8 Impact Identification and Evaluation of Significance

2.8.1 Identification of Impacts

The following approach supports identification of environmental, social and cumulative impacts:

- Review of previous studies, surveys, impact assessments, environmental monitoring data in the proposed location area (transmission route) and associated facilities within the scope of the Project;
- Review of the design documentation, including potential alternatives, as well as characteristics of the proposed operations (separately for construction, operation, decommissioning) and associated activities which may cause environmental, social and human health impacts.
- Consideration of the local area development plans and strategic development programmes for the region.
- Review of applicable national and international requirements and standards, and requirements of the World Bank.
- Stakeholder consultation including, their input to identification of mitigation measures, their fears in respect to the project impacts,contribution to the control of Project impacts. Stakeholder engagement should be initiated early in the Project, to ensure open access to all relevant information;
- Source-Path-Receptor Analysis. Potentially significant social and environmental impacts are also identified by structured analysis of potential sources of impacts, ways they can impact the environment and human health (e.g. direct impact or transport of pollution emissions/discharges in the environment), and sensitivity of potentially affected receptors.

2.8.2 Project Implementation Phases

A phase of any project is a period of time when certain activities are implemented that collectively shape a stage in the Project life cycle. The following phases are considered by the ESIA Report:

- Construction;
- Operation; and
- Decommissioning (including demolition/dismantling).

The above project phases may be combined (integrated) for assessment, or they may be separated for a more detailed review, as appropriate.

2.8.3 General Approach to Impact Assessment

An impact is any change to an environmental or social (including community health and safety) receptor, whether direct or indirect, expected to result from the construction, operation and decommissioning of a proposed Project. Impacts on individual receptors may be negative (adverse) or positive (beneficial).

The actions undertaken to determine and evaluate the significance of potential project impacts is illustrated in Figure 2-2 and involves four key steps:

- **Prediction:** What will happen to the status of specific receptors as a consequence of this Project (direction, extent, duration, reversibility)?
- **Evaluation of significance:** How significant is the impact? What is its relative significance when compared to other impacts?
- **Mitigation:** If there are impacts of concern (adverse), can anything be done to avoid, minimize or offset the impacts? Or to enhance potential beneficial impacts? And;
- **Residual impact assessment:** After mitigation, are the impacts still of concern?

If yes, the process needs to be repeated at least once before the 'final' determination of residual impact significance occurs. A residual impact is the impact that remains following the application of mitigation measures. Once mitigation and enhancement measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation and enhancement measures.

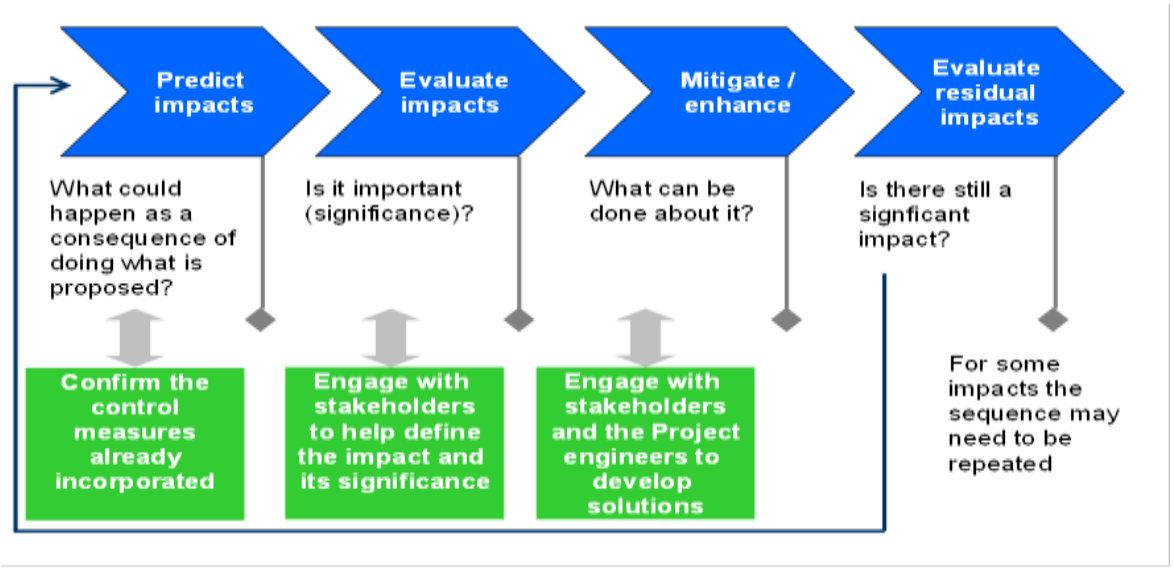


Figure 2-2: Impact Evaluation Process

2.8.4 Prediction

Impact prediction involves determining the magnitude or extent of a change or changes in the status of a receptor or linked receptors resulting from the planned operations, through application of forecast models, analysis of experience of similar operations, or environmental science. Impact prediction provides valuable information to determine the broader characteristics of impacts.

2.9 Impact Types

Impacts can be divided into types, and also exhibit a number of characteristics. The degree to which an impact may be managed or modified by the mitigation measures is dependent

upon the impact type and its characteristics. Table 2.2 provides definitions of key impact types. All of these impact types exhibit certain characteristics in terms of:

- Reversibility;
- Extent;
- Duration; and
- Frequency.

Table 2-2: Classification of Impact Types

Classification of Impacts	Definition	Characteristics
By overall effect	Beneficial	Impacts expected to result in positive changes at the identified receptors
	Adverse	Impacts expected to result in negative changes at the identified receptors
By origin	Direct	An impact that results from a direct interaction between a planned activity and the receiving environment (receptors)
	Indirect	An impact that follows on from the primary interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g. increased demand for resource as a result of workforce drift to the area of planned activities from other regions, or feedback effects in ecosystems affected by direct impacts)
By the nature of secondary effects	Cumulative	Project impacts which may be amplified if combined with impacts caused by third party operations (projects) on the same resources and/or receptors

2.9.1 Evaluation of Significance: Planned Events

Impacts significance is assessed in this Report using the qualitative, and where possible quantitative methods applicable for major project ESIAs. The quantitative methods provide an outlook of the measurable changes induced by the Project, based on available design documentation or experience of similar facilities.

The qualitative methods are based on expert estimations, experience of other projects of similar nature and scale, and follow a structured format to produce consistent and logical projections. It should be noted that environmental impacts are sometimes difficult to evaluate in quantitative terms, due to their intangible nature (e.g. emotional impacts or sensitivity), or due to interrelation of the change and specific local situation (e.g. scale of migrant inflow compared to the baseline population).

The impacts are assessed in a structured and coordinated manner throughout the ESIA process. The approach adopted enables attribution of potential impacts to specific environmental and social aspects. For adverse impacts, significance is assigned based on determining impact magnitude and receptor sensitivity, after which mitigation is identified depending on impact characteristics.

Beneficial impacts are identified, assessed and evaluated, making use of impact magnitude (as per the guidance below), but not receptor sensitivity. Instead, beneficial impacts are described and evaluated based on available data, alignment with government policies/targets, stakeholder inputs and professional expert judgement. Measures to enhance them will be identified to try to maximize the expected benefits. The magnitude of an impact is a measure of the scale of a change from baseline conditions for a receptor. This measure of change can be described by considering the following criteria in combination:

- **Reversibility:** Restoration of the pre-impact status of a receptor.
- **Extent:** Spatial extent (e.g. pollution dispersion or habitat impacted) or population/ community extent; and
- **Duration:** Period of time over which an impact will interact with a receptor. This factor may also cover the frequency and regularity criteria, or they can be considered separately.

The magnitude of each impact is assessed using the above criteria and the characteristics provided in **Table 2-3.**

Table 2-3: Description of Impact Criteria

Criterion	Description	Definition
Reversibility	Irreversible	Impacts that cause a permanent change in the affected receptor
	Reversible	Restoration of the pre-impact status of a receptor due to mitigation/reinstatement measures and/or natural recovery. Duration of an impact and a subsequent recovery period shall be considered
Extent (spatial)	Site	Within the boundaries of land and water area allocated for the Project and associated use-restricted zones (sanitary protection, security, etc.)
	Local	Within the boundaries of local municipality
	Regional	Within the boundaries of a region, territory, republic
	National	Impacts that affect more than one region or constituent entities of Kenya's water flows/bodies of national significance
	Transboundary	Impacts that affect receptors beyond the boundaries of the country in which the project is located and producing transboundary/ global effects (e.g. impacts of greenhouse gas emissions)
Duration	Short-term irregular or occasional	Impacts caused by short-term single or recurrent events
	Mid-term regular or associated with a phase of activities	Impacts with duration equal or nearly equal to that of certain activity or a phase of the planned operations
	Long-term	Impacts with duration equal or comparable to the Project lifetime. Impacts of this category may cease after completion of Project activities

Assessment of duration of an impact also considers its frequency (e.g. single, rare, periodic, and constant) for a more detailed characterization of duration of time when impact is felt. All characteristics listed above are factored into the assessment of impact magnitude. Table 2-4 provides generic criteria to be used to determine the impact magnitude. Taking the results derived from the previous step, a decision can be made on impact magnitude (negligible, low, moderate, high). Discipline specific criteria have been determined if appropriate and presented in Chapters 8 and 9, respectively.

Table 2-4: Impact Magnitude

Impact	Criteria
Negligible	No persistent discernible impact. The change is essentially indistinguishable from natural background variation.
Minor/Low	Limited impacts that can be identified by the available means of monitoring, with no effect on functions of ecosystems and communities **Extent:** Local **Duration:** Short/medium term **Reversibility:** Reversible
Moderate	Noticeable impacts which may result in quantitative changes in ecosystems, however without their quality transformation, and without loss (partial or complete) of their natural functions. **Extent:** Local/regional **Duration**: Medium/long term **Reversibility:** Reversible/irreversible
High/Major	Prominent impacts that may result in temporary or permanent transformation of ecosystems, with loss of their functions, and transformation of communities' lifestyle and quality. **Extent**: Regional / national / transboundary **Duration:** Medium / long term **Reversibility**: Reversible / irreversible

Once the respective magnitudes of each impact have been allocated the next step is to determine receptor sensitivity. Receptor sensitivity is based on two components: the degree to which a receptor is resilient to a change and the value attributed to the receptor by stakeholders or applicable regulations/policies.

Receptor resilience takes into consideration not only activity-receptor-impact pathways, but also the characteristics of a receptor that might make it more or less resilient to change. As such, a receptor can be considered as existing within a spectrum of 'vulnerable' to 'resilient'. Receptor value considers importance represented by conservation status, socio-cultural importance and/or economic value. Certain receptors are deemed to be of greater importance than other receptors.

The final step is to combine the impact magnitude and receptor sensitivity results to determine impact significance in relation to its receptors. For known (planned) impacts, significance is determined by their intensity, based on the impact magnitude and sensitivity of the receptor. For example, an impact of low magnitude affecting a receptor of moderate sensitivity is an impact of low/moderate significance (the actual significance determination

-low or moderate-in this case can be made by the ESIA team) or an impact of high magnitude affecting a receptor of moderate sensitivity results in an impact of high significance. Table 2-5 provides an account of the key features (definitions) of each of the impact significance classifications (from Not Significant to High); specifically linking them to need for mitigation measures.

Table 2-5: Impact Significance Matrix

		Receptor Sensitivity			
		Negligible	**Low**	**Moderate**	**High**
Impact Magnitude	Negligible	Not Significant	Not Significant	Not Significant	Not Significant / Low35
	Minor	Not Significant	Low	Low / Moderate	Moderate
	Moderate	Not Significant	Low / Moderate	Moderate	High
	Major	Low	Moderate	High	High

Definitions of the above significance ranks adopted in international ESIA practice are provided in **Table 2-6.**

Table 2-6: Project impacts ranking by significance

Impact Significance	Description
Negligible	Impacts are expected to be indistinguishable from the baseline or within the natural level of variation. These impacts do not require mitigation and are not a concern of the decision-making process.
Low	Impacts with a "Low" significance are expected to be noticeable changes to baseline conditions, beyond natural variation, however well below the applicable standards (e.g. environmental quality standards, and are not expected to cause hardship, degradation, or impair the function and value of receptor. These impacts warrant the attention of decision-makers and shall be avoided or mitigated where practicable.
Moderate	Impacts with a "Moderate" significance are likely to be noticeable and result in lasting changes to baseline conditions, which may cause hardship to or degradation of a receptor, although the overall function and value of a receptor is not disrupted. These impacts must be mitigated to avoid or reduce the impact.
High	Impacts with a "High" significance are likely to disrupt the function and value of a receptor and may have broader systemic consequences (e.g. ecosystem or social well-being). They may also result in a failure to maintain adverse effects within the permissible regulatory levels. These impacts are a priority for mandatory mitigation to avoid or reduce the significance of the impact.

This method is applied at least twice: to both pre- and post-mitigation scenarios for all impacts identified. In general, residual impacts classed as "Not Significant" or "Low Significance" are not considered to be of concern for the assessment. For adverse impacts of "Moderate" and "High" significance, an iterative process is undertaken to further

investigate opportunities for mitigation, according to the hierarchy above. Where the significance cannot be further reduced, an explanation is provided of why further reduction is not practicable. Monitoring may be required to confirm the measures used to mitigate adverse impacts are working properly and that the impact is not worse than predicted. Monitoring requirements are presented in Chapters 8 and 9.

2.9.2 Risks and Unplanned Events

Where there is uncertainty about occurrence of an event (e.g. intrinsically occasional event during normal operation and/or where impacts are caused by unplanned/emergency situations), the magnitude of risk associated with such event is determined as a function of its occurrence probability and intensity of potential impact. Probability criteria applicable to this ESIA are described below (Table 2-7). They are set for the whole ESIA process and are equally applicable to all types of impact.

Table 2-7: Risk occurrence criteria

Likelihood	Qualitative assessment of impact/event probability
High	Impacts/events which are observed in the sector (studied operations or region) and reoccur more than once a week
Moderate	Impacts/events regularly observed in the sector and region, including seasonal cycling, which can be considered as very likely for the design lifetime of the planned operations
Low	Impacts/events which are rarely observed in the sector and region, or regularly observed in other sectors. These would generally occur 1 to 2 times per year
Not significant	Impacts/events that have never been observed in a wider range of sectors or in the region. Impact/event which can be considered as unlikely for the design lifetime of the proposed operations

The criteria of general risk/impact (change) occurrence risk are shown in Table 2-8.

Table 2-8: General risk/event occurrence risk criteria

	Impact intensity			
	Not significant	Low	Moderate	High
High	Insignificant	Medium / Minor	Medium / high	Critical
Moderate	Insignificant	Minor	Medium	High
Low	Insignificant	Minor	Medium / minor	Medium / high
Not significant	Insignificant	Insignificant	Minor	Medium

Unplanned events will often result in a high impact significance, even with mitigation/remedial measures in place e.g. oil spills. In such cases, not only the specific measures must be in place to manage an unplanned event, but the probability has to be minimized to levels seen to represent good industry practice. In this table, unplanned events with high residual impact significance would need to be minimized to extremely unlikely (Improbable) events. Sometimes, if such events can be assessed quantitatively, a special analysis of risks is required to define numeric value of the event probability. In this case the probability value should be less than $1x10^{6}$.

2.9.3 Impact Mitigation

Mitigation measures are developed as necessary or appropriate to minimize the risk intensity and/or impact probability, and therefore make the impact or risk less significant. Assessment of significance of potential impact/risk has been assessed during the ESIA process. As part of the ESIA process, when adverse impacts are identified, measures for mitigation, minimization and control of risks, and monitoring of residual impacts are developed (as necessary or appropriate). A residual impact is the impact that remains following the application of mitigation measures. The process of identifying design controls and mitigation measures must follow the sequence of the mitigation hierarchy **(Figure 2-3)** which is widely regarded as the best practice approach to managing impacts.

First, efforts are made to avoid or prevent, then minimize or reduce adverse impacts. If the impact cannot be fully avoided by application of design controls, they are supplemented by further engineering measures for minimization and mitigation of the adverse impacts. These measures are supplemented by additional mitigation measures to be applied through the effective management of project-related activities during construction, operation and de-commissioning. Any remaining residual impacts are then addressed via mitigation measures such as restoration and remediation (e.g. at the end of construction) and/or offsetting and compensation. The measures are developed and implemented in the same order as they are listed above.

Figure 2-3: Mitigation Hierarchy

Development of mitigation measures will be primarily focused on minimization of the impacts of "High" significance. However, where possible and appropriate, mitigations are also proposed for the impacts of "Moderate" and "Low" significance, in order to reduce environmental and social effects/risks to the lowest level.

3 PROJECT DESCRIPTION

This chapter describes the project, with information on its location, project components and the activities required to build them are presented, to provide the basis on which this ESIA has been undertaken.

3.1 Project Location

The proposed Mwache/West Mainland and Changamwe water transmission pipeline line traverses three counties i.e. Kwale County, Mombasa County and Kilifi County.

Mombasa County is situated in the South east of the Coastal region which has a total area of 230km² kilometers and inshore waters covering 65km^2. Mombasa County is bordered to the North by Kilifi, to the South by Kwale, to the East by the Indian Ocean. It lies between latitudes 3° 80' and 4° 10' S and longitudes 39° 60' and 39° 80' E. **Kwale County** is one of the 47 counties in Kenya. It is located in south coast of Kenya, it borders the Republic of Tanzania to the South West, and the following Counties; Taita Taveta to the West, Kilifi to the North, Mombasa to the North East and the Indian Ocean to the East. Kwale County covers a total surface area of 8,270.2 square km and accounts for 1.42 per cent of Kenya`s total surface area. **Kilifi County** lies between latitude 2^0 20" and 4^0 0" south and between longitude 39^0 05" and 40^0 14" East.

3.2 Project Routing

The proposed Mwache/West Mainland and Changamwe water transmission pipeline line ('the Project') traverses three counties i.e. Kwale County, Mombasa County and Kilifi County. The transmission lines start with a 2.9 km common section of the transmission mains at the proposed West Mainland Reservoir at an outlet elevation of 95 masl, traversing S.E. to cross the Nairobi-Mombasa Highway at approximately 250m S.E of the reservoir site. Upon crossing the Nairobi-Mombasa Highway, the transmission pipeline traverses Southeast, along the Highway for approximately 2.2km to the Mombasa Southern By-Pass interchange at Ch. 2+465. Upon crossing the interchange, the transmission pipeline branches into two pipelines, one 8.9km pipeline serving the West Mainland Demand area (West Mainland service line) and the second 8.9km pipeline being an express main transmitting the Mombasa Island flow allocation from the West Mainland Reservoir to the Changamwe reservoir. The two pipelines continue along the Nairobi-Mombasa Highway, one pipeline on either side of the highway, for 8.9 km to the existing Changamwe reservoir site at Birikani. Numerous en-route offtakes will be provided on the West Mainland and Changamwe transmission pipeline, connecting to the existing network within the West Mainland area and replacing the existing twin Mzima Pipelines. Existing offtakes will be transferred to the new pipeline. At Jomvu, one of the existing twin Mzima Pipelines branches off to join Magongo Road while the other continues along the Nairobi-Mombasa highway. The proposed transmission mains will continue along the highway to the Changamwe reservoirs, with an offtake to serve the existing connections on the Mzima Pipeline branching to Magongo road. The offtake will be connected to the recently constructed DN 500 Marere Pipeline, which runs parallel to the Mzima Pipeline along Magongo Road. The existing offtakes on the Mzima Pipeline will need to be transferred to the DN 500 Marere Pipeline, to continue serving the area. The transmission pipeline

length is 20.5km running from the proposed West Mainland reservoir in Kwale County and terminating at the Changamwe reservoir in Mombasa County on a proposed 6 metres wide Right of Way (RoW).

2 Nr. Reservoirs are proposed namely Changamwe Reservoir proposed to be constructed within the site for the existing Changamwe situated along the Nairobi-Mombasa highway, adjacent to the Refinery Road Junction within the Mombasa West Mainland and West Mainland Reservoir located within Bonje area, approximately 150m to the East of the Mombasa-Nairobi Highway and 200m North-West of the old meter gauge railway line. They will be rectangular shaped reinforced concrete water storage tanks with two compartments and a 14,000m3 capacity, with a depth of 5m.

The proposed alignment for the transmission pipelines to Changamwe and the West Mainland are as shown in the **Figures 0.2 and 0.3** and also shows a planned trunk main pipeline and other transmission main in blue which will originate from the WTP in Mwache Dam currently under construction to the proposed west mainland reservoir. This ESIA does not identify the impacts of the proposed trunk main pipeline, which is part of the South Mainland. A separate ESIA has been prepared for this South Mainland pipeline transmission line.

Table 3-1 below gives a brief outline of the pipeline route to Changamwe and West Mainland supply area. The chainages indicated are based on the distances from the start chainage of the common pipeline at the West Mainland reservoir.

Table 3-1: Description of Project Routing

Section	Chainage	Description
1	0+000	West Mainland Reservoir Outlet at 95 masl
2	0+000 – 0+250 •	• Pipeline section traverses S.E. through a private parcel of land to the Nairobi – Mombasa Highway • Pipe crosses the Nairobi-Mombasa Highway at Ch. 0+250 to the left hand side.
3	0+250 – 2+204 •	Pipeline section along the Nairobi-Mombasa Highway up to Ch. 0+250 • At the Mombasa Southern By-Pass, the pipeline crosses the interchange on the LHS of the highway. • Pipeline to be laid across the road via trenchless tunnelling • 3Nr. Road crossings on interchange section. • Section is encroached and resettlement needed. RAP report has been prepared and includes the Project Affected Household (PAH).
4	2+204 – 2+900	• Pipeline section along the Nairobi-Mombasa Highway, on LHS of At Ch. 2+900, Pipeline branches into two Pipelines, forming a twin main, one pipeline transmitting the flow allocation for the Island to Changamwe Reservoirs and the second to serve the West Mainland supply area • Dedicated Pipeline to Changamwe crosses the Nrb-Msa highway, to the righthand side of the road. • Pipeline designated to serve the West Mainland area remains on the Left hand side of the road.

		• Section is encroached and resettlement needed. RAP report has been prepared and includes the Project Affected Household (PAH).
5	2+700 – 11+470	• Pipeline proposed to be laid to replace the existing DN 500 twin Mzima Pipelines along the highway. • The WML pipeline, on the LHS of the road leaves the Nrb-Msa highway road reserve at Ch. 3+620 and follows an access road behind the first row of buildings, crossing a stream adjacent to the road-side dump site at Miritini,then back along the highway at Ch. 4+005. The pipeline to Changamwe continues on the RHS of the highway. • Stream crossing at Ch. 3+880, adjacent to an existing temporary dump site within Miritini. • Pipeline route characterized by numerous paved and unpaved road crossings, including but not limited to; - Link road to Magongo road at Ch. 6+800 - Road to Jomvu kuu at Ch. 6+880 - Junction to Mikindani at Ch. 9+200 - Several paved access roads to estates, industrial parks, business premises, etc. 1Nr. Railway crossing on the old meter gauge railway for each of the 2Nr. • Pipelines at Ch.. 10+945 in Changamwe. • The express pipeline to Changamwe reservoirs on the RHS crosses the highway at Ch.11+470, entering the Changamwe Reservoir site. • The pipeline on the LHS of the highway goes past the Changamwe reservoir site and terminates at the refinery road junction. • The pipeline route on both sides of the highway is characterized by numerous encroachments in form of temporary and permanent structures and buildings,etc. • A Resettlement Action Plan has been prepared and 274 Project Affected Households (PAHs) have been identified who will be compensated for the loss of structures and income based on the World Bank OP 4.12. Out of the 274 PAHs, there is one land owner who is entitled for compensation for loss of land and 273 PAHs who are categorized as encroachers on the GoK ROW and entitled for compensation for loss of structures and income only.
6	11+470 – 11+670	• Pipeline section within the Changamwe Reservoir Site (new reservoir to be built). • Terminal point of the pipeline at Ch. 11+670 • Resettlement not required at the proposed reservoir site which is on land already owned by CWWDA.

3.3 Project Design

3.3.1 General

The design depth of cover for the Transmission Mains under the detailed design has generally been kept to a minimum of 1.0m to pipeline crown as far as applicable, depending on the localized topography. To reduce the number of changes in grade, the cover to pipe in the detailed design has been varied from this minimum to a maximum of approximately

3.5m. Pipeline depths greater than 3.5m have been limited to localized high points. The proposed pipe options (steel or ductile iron) can tolerate a dead load due to soil cover of up to 5m provided that trench backfilling is carried out strictly in accordance with the specifications.

Various pipe accessories have been allowed for in the Preliminary Design of the transmission pipelines, to ensure effective and efficient operation and maintenance of the transmission pipelines. These accessories are useful in carrying out operations such as inspections, filling and emptying of the pipeline, testing, cleaning/scouring, pipeline route identification as well as carrying out repair of isolated sections of the pipeline. In addition, pipeline appurtenant structures have also been allowed, for pipeline support and anchorage, pipeline protection and to ensure ease of access for operation and maintenance of the pipeline accessories.

3.3.2 Transmission Pipelines

The proposed transmission pipelines will start from the West Mainland reservoir outlet as a single DN 1200 Pipeline then it will branch into two independent transmission pipelines at Cha. 2+900, upon crossing the Southern By-Pass Interchange. The dedicated line to be serving the West Mainland will start as a DN 1000 for 2.9 Km , at the branching point, reducing to DN 900 for the intermediate section (1.4km), then to DN 400 for the last section with a length of 4.6km. The quantity of water that will be supplied by the West Mainland Pipeline to beneficiaries is 70,200 $m^{3.}$ Per day based on the detailed design projections and updated demand for year 2035.

3.3.3 Pipeline Accessories

Pipeline accessories incorporated in the transmission pipelines preliminary design include air valves, wash out valves, isolating valves, flow control valves, bulk water meters, marker posts, etc. The purposes and outlines of pipeline accessories are presented below. Typical details of their installation will be provided in the set of drawings that will be prepared at the detailed design stage.

3.3.3.1 Air Valves

Air valves are a crucial component in pipeline systems. There are different types of air valves, each of which serves a particular purpose in its system. Essentially, air valves act on control of the flow of air in a pipeline, and the type of valve chosen is directly related to the air flow requirements of the system.

3.3.3.2 Washout Valves

Washout valves will be provided to facilitate drainage of pipeline segments to remove accumulated/settled silt and for emptying sections of pipeline for repair purposes. The washouts will be installed at low points in the pipeline profile and shall comprise of an invert T-Branch from the main pipe and a gate valve (size will vary depending on size of transmission main). Drainage and outfall structures must be provided to facilitate drainage of pipes to existing water course without causing erosion.

3.3.3.3 Isolating Valves

Isolating valves, also referred to as line valves or sectional valves will be provided to limit the length of pipeline to be drained for operation and maintenance purposes and also to limit spillage/wastage of water in the event of an emergency such as a pipeline burst/ rupture. These will be allowed for at pre-determined intervals based on the pipeline layout and profile. The line valves will preferably be butterfly valve, conforming to BS 5155 and EN 593. The advantage of butterfly valves over gate valves is to limit the height of the valve chamber and also the depth of the pipes in buried chambers, as well as for cost reduction. In order to minimize sedimentation and to avoid any problems in closing the valve, the shaft of the valves shall be installed in horizontal position. The design velocity of flow in the water transmission pipelines is less than 2m/s. This velocity is admissible for butterfly valves to l.

3.3.3.4 Flow Control Valves

Flow Control Valves are used to regulate the flow rate of fluid in an hydraulic pipeline or system. They ensure that the flowrate in the pipeline is maintained at all times, essential to system performance. A flow control valve has been allowed for at all terminal reservoir inlets to secure a smooth hydraulic operation of the water transmission system.

3.3.3.5 Bulk Water Meters

Bulk water meters will be provided at the WTP clear water tank outlet, at the offtake point for each of the transmission pipelines and at the inlet into each terminal reservoir, for flow measurement and water balance calculation for the water transmission pipeline system. There are three main types of bulk water meters namely:

- Electro-magnetic bulk water meters
- Mechanical bulk water meters
- Ultrasonic water meters

For the Mwache water transmission pipelines project, battery powered Electro-Magnetic meters shall be specified, which will provide real-time flow measurement in addition to cumulative flow. Electromagnetic meters have been preferred over ultrasonic meters because they are more accurate. The use of mechanical meters has been ruled out since mechanical parts in the meters tend to deteriorate with time leading to flow under reading.

3.4 Ancilliary Infrastructures

3.4.1 Staff Houses

Water production and distribution is a continuous process requiring a 24hr monitoring/operation. For this purpose, it is imperative to have some operation and maintenance staff housed within the Reservoir sites. 1 Nr. Double unit semi-detached staff houses (2Nr. Units), each of internal floor area 40m^2 with a kitchen, one bedroom, living room, toilet and washing facilities have been provided for the new reservoir site (West Mainland). The staff houses shall be masonry, with coloured concrete tile roofing and ceramic floor tiling. Windows to be metal casement windows with 4mm thick glazing.

3.4.2 Guard House and Fencing

The reservoir sites are critical installations which require full time security and controlled access. Sites without existing fence will be fenced off to prevent unauthorized access. A guard house with an operations office will be provided at the gate, to regulate and keep records of visitors and for general operation and maintenance of the reservoir. The guard house/operator's office will be provided with a toilet and hand washing facilities and will also have a control room/store to house the electricity control panel and for storage of basic tools. Pillars have been provided at the main entrance and to access the administration building, with a 1m wide pedestrian gate to the staff houses, which have been provided with an internal fence.

3.4.3 Access Roads and Internal Roads

The new proposed reservoir sites have no existing access roads. New gravel all weather access roads will be constructed to facilitate all weather motorable access, especially for supply of chlorine and any pipes or fittings that may be required under repair and maintenance operations. Internal roads leading to chlorine storage, mixing and dosing building, staff houses, guard house/operators office, administration building and to the staff houses have been allowed for. These will be paved using interlocking concrete blocks for ease of maintenance and to ensure durability.

3.4.4 Drainage

Storm water cut-off drains and scour/overflow drains have been provided at the reservoir sites to prevent erosion of embankments and/ or to prevent storm water from flooding the site and compromising the infrastructure. Storm water drains will either be unlined earth drains or inverted block drains, depending on their location with respect to buildings, structures and roads. Unlined earth drains will be grassed to avoid scouring. At road crossings, the open drains have been provided with precast concrete culverts of varying sizes. HDPE DWC drainage pipes and precast concrete chambers have been provided for overflow and scoure drainage system from the proposed storage reservoirs.

3.4.5 Power and Lighting

The proposed transmission pipeline system is purely by gravity and hence not power intensive. Only few control applications requiring power. Within the Reservoir sites, power will be provided mainly for domestic use within the staff houses and administration building, within the chlorine storage, mixing and dosing buildings, for security lighting and to allow use of small hand tools within the reservoir sites.

The total size of land to be acquired for the construction of the ancillary infrastructures is 8.65 acres.

3.5 Construction Equipment

The construction will involve the use of the following equipment as shown in table 3-2 below.

Table 3-2: Equipment and Machinery

Description	Quantity
Excavators >0.5m^3	Uknown
Trucks > tonnes	Uknown
Total Station and ancillaries	Uknown
Pipe jacking equipment, > DN 200mm	Uknown
Concrete Vibrators	Uknown
Rock breaker	Uknown
Back Hoe Excavator	Uknown
Water bowser	Uknown
Jack Hammer	Uknown
Pipeline Pressure Testing Equipment	Uknown
4WD Pick up	Uknown
Compressor	Uknown
Butt Fusion Equipment	Uknown
Generator	Uknown

3.6 Raw Materials and Construction Waste

During the construction phase, it can be expected that the following raw materials will be required:

- Cement
- Reinforcing steel
- Fine and coarse aggregate for concrete and reinstatement of road works and paved areas;
- Gravel for road surfacing
- Selected granular material in fill and bedding
- Timber for formwork
- 700 HDPE pipe for trunk main, 200 mm steel pipe
- Valves and penstocks
- Water (approximately 12,000m^3); for dust management, concrete works, hydrotesting etc.
- Fuel.

The principal waste products expected during the construction phase include:

- Excess excavated material (spoil). The quantities of excess spoil is expected to be very insignificant mainly because the depth of the trenches is 1-3 metre deep and 2 metres wide hence spoil not significant and further, spoil material will be used as backfill. The ROW is 6m but only 2-3ms will be excavated with the remaining area serving as ROW and facilitating construction and for maintenance during operation.
- Excavated material which is not suitable for pipe bedding or backfill
- Spoil from land clearing and excavation works, mostly grass, roots, a few trees, road paving, cabro blocks, etc. These will be used as backfill unless determined to be inadequate where they will be disposed in a NEMA approved waste disposal site.

- Debris from construction and demolition works; (scrap materials, nails, bricks, concrete, timber, steel; plastic materials)
- Hazardous waste such as cement residue; oils, grease etc.
- Wastes from the sanitation facilities for the construction workers.
- Solid waste from the Contractor's camp from food scraps, food packaging, etc. A separate ESIA for the contractor's camp will be prepared in the event that the contractor decides to set up a worker's camp.
- Gaseous waste from combustion products from construction engines, welding gas, etc.

3.7 Construction Methods

Construction methods employed for the laying of the new pipelines include:

- Open trenching of depth ranging from 1.0-3.0m depending on the localised topography.;
- Trenchless method for road crossings
- Placing of fill, gravel road surfacing and paving
- Demolition of existing buildings
- Dewatering as necessary
- Pipe laying
- Concreting
- Building works including electrics and plumbing
- Digging of trenching (using manual implements and limited motorized/mechanical equipment;
- Pipe laying;
- Covering of trenches
- Demolition of existing structures which could be on the proposed ROW (most of structures on the ROW are mobile and temporary and will not require demolitions. However, pavements and perimeter walls of structures may be demolished and hence generate wastes.
- Concreting in certain sections where there will be construction of chambers. This will require cement, sand and masonry blocks. The quantities shall be minimal

Figure 3-1 below show the typical construction methods for laying of small sized water pipelines which are mainly hand held implements which generate insignificant noise and air emissions. The stock pile is also limited and backfilled immediately. The truck used are normal truck and only supply pipes when an area is completed with respect to trenching.

Figure 3-1: Construction and laying of pipeline

3.7.1 Construction Methods in River Crossings

Under river crossings will be provided at river channels, streams and gullies provided that:

- Construction will be possible without major difficulties
- Construction will not lead to serious environmental impacts of upstream and downstream environment
- The soil structure is not susceptible to movements due to ground water and will not lead to flotation of pipeline
- The water flow velocity on the river channel is not high
- The pipeline will be accessible for maintenance purposes i.e. draining of washouts

The pipeline in under river crossings will be surrounded with mass concrete and protected with approved granular fill material and gabion mattress. The channel sides will be protected by gabions. Additional erosion control measures and drainage channels will also be provided on the valleys to ensure that the pipeline is not exposed.

Aerial Crossings

The preferred design for pipeline crossings is for buried installation of pipeline. Aerial Crossings where required will be by pipeline supported by Reinforced Concrete Piers. Aerial crossings will be provided on the following circumstances:

- Large river crossings where river diversion for an undercrossing would be expensive.
- Where pipeline construction below ground will be difficult to undertake due to slope stability
- Rivers and streams with a steep channel slope leading to high velocity of flow

- Situations where construction of an undercrossing will lead to serious environmental violations
- Where the soil structure will not permit an undercrossing due to soil movements. Such situations, pier foundations will be driven to a solid rock (In the case of the Mwache Creek Crossings, Pilling has been specified).
- For easy access to pipeline for maintenance and avoidance of unnecessary fittings for washouts and air valves or deep excavations.

The height of overcrossings over river channels has been determined by the flood level based on assessment of river hydrology and channel shape as well as historical flood levels where necessary. Reinforced concrete piers have been adopted, with spans of 9m maximum for Steel pipelines (type 3 on Drawing M430/SD/13 in the Books of Drawings) and 7m maximum for Ductile Iron pipelines (one pier close to each pipe socket). The maximum pier height will be 4.5m above ground. The pipeline will be supported on the pier head and anchored to the pier by a 75mm wide by 15mm thick GMS strap bolted to the pier. The GMS strap around the pipe will be encased in concrete to prevent corrosion as well as to avoid vandalism. Pier foundations will be anchored on a solid ground, preferably rock. Where the rock depth is deep, support piles will be driven to a solid ground. Due to the corrosive nature of the coastal environment, Steel bridges for aerial crossings have been avoided.

3.7.2 Construction Methods in Road and Railway Crossings

Trenchless Road/Railway Crossings

On sections where the transmission pipelines are designed to be laid across busy/heavy traffic roads, the old Meter Gauge Railway and the new Standard Gauge Railway, trenchless crossings in form of Precast Concrete panel lined tunnels have been provided. These include;

- 1Nr. Crossings each at the Miritini road to Nairobi-Mombasa Highway junction, Mikindani road to Nairobi-Mombasa Highway junction and the Magongo road to Nairobi-Mombasa Highway junction, for the Transmission Mains to West Mainland and Changamwe.

The pipelines on this section will cross the railway via aerial crossings on R.C. Piers. The pipeline invert shall be set above the invert of the bridge girder, to ensure the clear headroom of the railway track below the road is not compromised.

Open-cut Road Crossings

Open cut road crossings will be done on sections of the pipeline crossing light traffic roads such as paved and unpaved access roads to estates and to private property, etc. To ensure adequate protection of the pipe against external loading by traffic on the roads, a minimum cover of 1.5m to the crown of pipe will be maintained at the road crossings. In addition, the pipe will be encased in Class 15/20 mass concrete surround, of minimum thickness 300mm. To maintain the flexibility of any flexible joints, the concrete surround will be broken at joint locations. The pipe surface will be wrapped in two layers of LPE coating such as “Denso Tape” prior to casting of the concrete. Backfilling of the trench will be

done with approved backfill material in compacted layers of 150mm to a sufficient compaction density as the Engineer will direct on site.

Bituminous Carriage Way

- The reinstatement sub-base material to be put back shall be of the same thickness as the original adjoining pavement, subject to a minimum of 150mm.
- The reinstatement road-base to be put back shall be of approved bituminous material and of the same thickness as the adjoining pavement, subject to a minimum of 200mm.
- The approved bituminous surfacing layer to be put back shall be 105mm thick and shall consist of a 65mm thick base course and 40mm thick wearing course.
- Friction course may be absent in most urban roads, but where a friction course is present in the original road pavement, a friction course layer of the same thickness shall be put back.
- Material specification shall be in accordance with general specifications
- Reinstatement works shall be carried out in liaison with and to the approval of the Roads Authority

Bituminous Footway and Cycle track

- The sub-base to be put back shall be either of approved granular material to specifications of bituminous material and shall be of the same thickness as the adjoining original Footway or Cycle track subject to a minimum thickness of 75mm
- The surfacing to be put back shall be 10mm nominal size wearing course material and shall be of the same thickness as the adjoining original Footway or Cycle track subject to a minimum of 25mm.

3.8 Erosion Control and Slope Structural Protection Measures

The rugged nature of the proposed pipeline route, which is characterized by steep slopes, makes it highly susceptible to erosion and sliding. The need to avert any erosion and landslides on the pipeline route has necessitated the adoption of various erosion control and slope structural protection measures. The methods proposed for erosion control range from plain surface grassing, grasscrete lining, to mass concrete erosion checks, with different combinations for different slopes. Gabion protection works have been specified for slope structural protection.

3.9 Pipeline Route Monumentation

The location of air valves, washouts, line valves and bulk meters will be identified by distinctive concrete indicator posts. Marker posts will also be located where the pipeline alignment changes, at all road crossings and at approximately 300m maximum interval. In those locations where the pipeline does not parallel an existing roadway, marker posts will be placed at the centreline of the pipe or along a line offset from the pipe. The offset distance will be shown on the marker post. The proposed marker posts design will be of different design to existing marker posts where the proposed pipeline runs along existing pipelines. This is to make it easier to identify the pipelines.

3.10 Construction Logistics

The construction and laying of the pipelines will be undertaken in the following step wise process and associated timelines. The construction of ancilliary infrastructures will be typical timelines associated with such facilities and do not present any adverse impacts to warrant timing related mitigation measures and are located in privately owned and access controlled areas/locations. The implementation period for the project (construction) is estimated to be 24 months.

Table 3-3: Construction Logistics

Activity	Timeline
Trenching/digging of trenches/trenchless methods	Use of mechanical excavation with limited manual excavations as determined by contractor.
Transport of pipelines	2 trucks transport pipelines to project site only once a day based on distance trenched/excavated. They drop the pipes and return back to storage yard.
Laying of pipelines	Pipes laid on the same day based on excavated distance. Pressure testing is done after full or partial backfilling.
Covering trenches using excavated stockpile material	All trenched/excavated sections are covered back-filled same day. No backfill material is left overnight unless weather conditions do not allow i.e. heavy rains limiting backfilling. To minimize sediment run-off, when not possible to back fill all trenches on the same day, appropriate methods shall be employed to minimize sediment run-off. In situations where trenches are not backfilled the same day, fencing, signage will be erected in harzadious sections and including deployment of guards if necessary.
Stabilising pipeline	Excavated and backfilled area is stabilized immediately after the backfilling and if need be revegetation is undertaken.
Reinstating of excavated roads	If the roads are excavated, the reinstating happens same day. The project will use in most instance micro-tunnelling in order to avoid destruction of the roads.
Contractor's camp and yard	Contractor shall identify storage yard and camp locations once awarded contract. Contractor shall prepare separate ESIA for such facilities and seek approval for the same.

4 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 Context

Kenya has undergone regulatory reforms over the past two decades, culminating in the enactment of a new constitution in 2010, which replaced that of 1969. This has, in turn, driven new policies and strategies relating to environmental management and conservation (including Environmental Impact Assessments).

The new constitution establishes the structure of the Kenyan government, the Bill of Rights, and provides the basic and comprehensive principles for environmental protection and management in the country. Under Chapter 5 (Part 1) of the constitution (Land and Environment), it requires that land be used and managed in "a manner that is equitable, efficient, productive and sustainable, and in accordance with the following principles: (a) equitable access to land; (b) security of land rights; (c) sustainable and productive management of land resources; (d) transparent and cost-effective administration and; (e) sound conservation and protection of ecologically sensitive areas; (f) elimination of gender discrimination in law, customs and practices related to land and property in land; and (g) encouragement of communities to settle land disputes through recognized local community initiatives consistent with this constitution". Furthermore, Part 2 of Chapter 5 is dedicated to the environment and natural resource utilization, management, and conservation, with reference to the establishment of EIA, environmental audit, and monitoring of the environment.

The constitution also stipulates that all minerals and mineral oils shall be vested in the national government in trust for the people of Kenya. Devolution of powers from the central government to the newly established 47 Counties is also specified by the constitution. County governments are in charge of planning and development, amongst other services, and can enact legislation with possible implications for planned and current projects. County governments also hold all unregistered community lands in trust on behalf of the communities who use it. Other reforms include the establishment of key administrative and legislative organizations that regulate the water and sanitation sector and development in Kenya.

4.2 National Policies and Legislation

Table 4-1: Summary of National Policies

Policy	Description
The National Environment Policy, 2013	The goal of the policy is to ensure a better quality of life for present and future generations through sustainable management and use of the environment and natural resources. The objectives of the Policy are inter alia to: • Provide a framework for an integrated approach to planning and sustainable management of Kenya's environment and natural resources; • Strengthen the legal and institutional framework for good governance, effective coordination and management of the environment and natural resources; and • Ensure sustainable management of the environment and natural resources, such as unique terrestrial and aquatic ecosystems, for national economic growth and improved livelihoods. Some of the guiding principles in the implementation of the policy include: • Environmental Right: Every person in Kenya has a right to a clean and healthy environment and a duty to safeguard and enhance the environment; • Right to Development: The right to development will be exercised taking into consideration sustainability, resource efficiency and economic, social and environmental needs; • Sustainable Resource Use: Environmental resources will be utilized in a manner that does not compromise the quality and value of the resource or decrease the carrying capacity of supporting ecosystems; and • Public Participation: A coordinated and participatory approach to environmental protection and management will be enhanced to ensure that the relevant government agencies, county governments, private sector, civil society and communities are involved in planning, implementation and decision-making processes. **Relevance** The implementation of the project shall be in adherence to the guiding principles of this policy.
National Policy on Water Resources Management and Development (Sessional Paper No.1 of 1999).	The management of water resources in Kenya is guided by four specific policy objectives, namely: • Preserve, conserve, and protect available water resources and allocate it in a sustainable rational and economic way; • Supply water of good quality in sufficient quantities to meet the various water needs, including poverty alleviation, while ensuring the safe disposal of wastewater and environmental protection; • Establish an efficient and effective institutional framework to achieve a systematic development and management of the water sector; and • Develop a sound and sustainable financing system for effective water resources management, water supply and sanitation development. **Relevance** The project shall be guided by the specific objectives of the policy and specifically with respect to the supply of good quality water and in sufficient quantities to meet the vaiorus water needs of the public.

The National Water Policy 2012 (Draft)	The Policy is built on the achievements of the sector reform commenced with the Water Act and based on the sector principles lined out in the National Water Policy 1999. On water resources management, the policy seeks the management of water resources along natural catchment/basin boundaries following the Integrated Water Resource Management approach. It aims to ensure a comprehensive framework for promoting optimal, sustainable, and equitable development and use of water resources for livelihoods of Kenyans through: • progressive restoration and protection of ecological systems and biodiversity in strategic water catchments; • increasing per capita water availability above the international benchmark of 1000 m. by 2030; • Maximizing use of transboundary water resources in coordination with other riparian countries; • Enhancing storm water management and rainwater harvesting; • Enhancing inter-basin water transfer in Kenya as a strategic intervention for optimized used of water resources; • Improving effluent waters treatment and recycling for use; • Ensuring sustainable groundwater resources for present and future generations; and • Developing a water management system which contributes to the protection of the environment. **Relevance** This project is geared towards increase of per capita water availability above the international benchmark of 1000m by 2030.
Kenya Vision 2030	The Vision for the water and sanitation sector is "to ensure water and improved sanitation availability and access to all by 2030". Kenya is a water-scarce country with renewable fresh water per capita at 647 m3 against the United Nations recommended minimum of 1,000 m3. The water strategy aims to intensify Kenya's access to safe water and better sanitation using the national network of water services boards, and the private sector, where necessary. The water programmes will integrate both water and sanitation components, thereby ensuring simultaneous development of water and sanitation with the right pricing. This is expected to bring individual and social benefits that will outweigh the investment costs. In the vision, specific strategies will be introduced to raise standards of the country's overall water, resource management, storage and harvesting capability. Some of the flagship projects for water and sanitation include the rehabilitation and expansion of urban water supply and sanitation in the key satellite towns identified under the economic pillar. **Relevance** Through this project, the water and sanitation vision "to ensure water and improved sanitation availability and access to all by 2030" is being achieved including meeting the strtagey aimed at intensifying Kenya's access to safe water and better sanitation.
Environment and Sustainable Development Policy, Sessional Paper No. 6 of 1999	This Policy aims to harmonize environmental and developmental goals for sustainability. It also provides comprehensive guidelines and strategies for government action on the environment and development. **Relevance** Activities associated with the implementation of the project could give rise to both environmental and social impacts thus the developments shall be developed in a sustainable manner.

The National Land Policy (Sessional Paper No. 3 of 2009)	The overall object of the national land policy is to secure land rights and provide for sustainable growth, investment, and the reduction of poverty in line with the governments overall development objectives. **Relevance** The project is likely to acquire land owned by public and private entities and will ensure that the rights of land owners are secured during the acquisition through the development of RAP.
The Kenya National Biodiversity Strategy and Action Plan, 2000	The overall objective of the NBSAP is to address the national and international undertakings elaborated in Article 6 of the Convention on Biological Diversity (CBD). It is a national framework of action for the implementation of the Convention to ensure that the present rate of biodiversity loss is reversed, and that present levels of biological resources are maintained at sustainable levels for posterity. **Relevance** The project shall ensure that it does not contribute to the loss of biodiversity as a result of its activities that may impact on biodiversity.
Economic Recovery For Wealth and Employment Creation Strategy 2006	The overall goal of the strategy is to ensure clear improvement in the social and economic wellbeing of all Kenyans; thereby giving Kenyans a better deal in their lives, and in their struggle to build a modern and prosperous nation. The key areas covered in the strategy are: • Expanding and improving infrastructure; • Reforms in trade and industry; • Reforms in forestry; • Affordable shelter and housing; • Developing arid and semi-arid lands, and • Safeguarding environment and natural resources. **Relevance** The project will contribute to the achievement of the overall goal and strategy which is to ensure clear improvement in the social and economic wellbeing of all Kenyans. Provision of clean water is a contributor to social and economic wellbeing of all Kenyans.
Kenya National Youth Policy 2016	This Policy aims at ensuring that the youth play their role alongside adults in the development of the Country. The National Youth Policy visualizes a society where youth have an equal opportunity as other citizens to realize their fullest potential. Proposed West Mainland Pipeline project will provide direct employment to the youth as required by the Policy. The policy provides direction for setting priorities. An important priority is to ensure that all ministerial strategies and their performance frameworks integrate gender equality objectives and indicators and identify actions for tackling inequality. In addition, each program will develop integrated gender equality strategies at the initiative level in priority areas. Within selected interventions, the policy will also scale-up specific initiatives to advance gender equality **Relevance** This policy shall be referred to during project implementation especially during hiring of staff to be involved in the project, procuring of suppliers, contractors to the project. The youth will be provided opportunity to participate in project implementation.

HIV/AIDS Policy 2009	The proposed project is to be implemented in the rural area, these areas have high prevalent cases of HIV and AIDS. In summary, the policy provides a mechanism for: • Setting Minimum Internal Requirements (MIR) for managing HIV and AIDS • Establishing and promoting programmes to ensure non- discrimination and non- stigmatization of the infected; • Contributing to national efforts to minimize the spread and mitigate against the impact of HIV and AIDS; • Ensuring adequate allocation of resources to HIV and AIDS interventions; • Guiding human resource managers and employees on their rights and obligations regarding HIV and AIDS. **Relevance** This policy shall provide a framework to both the project proponent and contractor to address issues related to HIV and AIDS.
COVID 19 protocols	During project execution (civil works), large numbers of workers will be required to assemble together in meetings, toolbox talks and even at work sites; varied number of workforce including suppliers of material and services are also expected to come in from various places in the country which may be COVID-19 hot spots; and interaction of workers with the project host community will happen as workers find accommodation close to work sites, and/or return to their homes after works. The potential for the spread of any infectious disease like COVID-19 by projects is high. There is also the risk that the project may experience large numbers of its workforce becoming ill and will need to consider how they will receive treatment, and whether this will impact on local healthcare services including the project host community. The presence of international workers, especially if they come from countries with high infection rates, may also cause social tension between the foreign workers and the local population. The Contractors will develop SOPs for managing the spread of Covid-19 during project execution and submit them for the approval of the Supervision Engineer and the Client before mobilizing to site. The SOPs shall be in line with the World Bank guidance on COVID-19, Ministry of Health Directives and site-specific project conditions; •Mandatory provision and use of appropriate Personal Protective Equipment (PPE) shall be required for all project personnel including workers and visitors; •Avoid concentration of more than 15 workers at one location. Where there are two or more people gathered, maintain social distancing of at least 2 meters; •All workers and visitors accessing worksites every day or attending meetings shall be subjected to rapid Covid-19 screening, which may include temperature check and other vital signs; •The project shall put in place means to support rapid testing of suspected workers for covid-19; •Install handwashing facilities with adequate running water and soap, or sanitizing facilities at entrance to work sites including consultation venues and meetings and ensure they are used; •Ensure routine sanitization of shared social facilities and other communal places routinely including disinfection of workstations, door knobs, hand rails etc.; **Relevance** To minimize the spread of COVID-19, the project shall adhere to the COVID 19 protocol.
Gender Policy 2011	The overall goal of this Policy Framework is to mainstream gender concerns in the national development process in order to improve the social, legal/civic, economic, and cultural conditions of women, men, girls, and boys in Kenya. The policy provides direction for setting priorities. An important priority is to ensure that all ministerial strategies and their performance frameworks integrate gender equality objectives and indicators and identify actions for tackling inequality. In addition, each program will

	develop integrated gender equality strategies at the initiative level in priority areas. Within selected interventions, the policy will also scale up specific initiatives to advance gender equality **Relevance** This policy shall be referred to during Project implementation especially during the hiring of staff to be involved in the project, and procuring of suppliers and sub-consultants, and sub-contractors to the project to ensure provision of equal opportunities to be provided for both male and females.

Table 4-2: Summary of National Regulations and Standards

Legislation	Provisions	Relevance to the Project
The Constitution of Kenya (2010)	Provides for protection and conservation of the environment and ensures ecologically sustainable development and use of natural resources; Mandates the State to: -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; and - encourage public participation in the management, protection, and conservation of the environment. -Accords every person the right to a clean and healthy environment and where this is being or is likely to be, denied, violated, infringed, or threatened, the person may apply to a court for redress in addition to any other legal remedies that are available in respect to the same matter	Consultations and agreement is required with the community and County government before developments are executed; and Implemented.
Environmental Management and Coordination Act 1999	Provides for protection and conservation of the environment, environmental impact assessment, and environmental auditing and monitoring.	An EIA of the potential interventions shall be carried out and EIA License to be acquired before the commencement of development. This report serves the purpose of registering the project with NEMA and seeking license.
The Physical and Land Use Planning Act, 2019	-Provide for controls on the use and development of land and buildings in the interest of proper and orderly development of an area. -Requires that development permission be sought through a development application.	-Development permission for buildings and other infrastructure on land under the jurisdiction of County Government of Mombasa, Kwale and Kilifi
The Public Health Act (Cap 242)	-Provides for the prevention of the occurrence of nuisance or conditions dangerous/injurious to humans. -Provides that the relevant local authority shall take all lawful, necessary and reasonably practicable measures -: -for preventing any pollution dangerous to health of any supply of water which the public within its jurisdiction has a right to use and does use for drinking or domestic purposes	-Generation of wastes during construction/rehabilitation of the water supply infrastructure; -Handling and storage of waste at the sites; and -Protection of water sources from pollution.

	(whether such supply is derived from sources within or beyond its jurisdiction); and - for purifying any such supply which has become so polluted, and to take measures (including, if necessary, proceedings at law) against any person so polluting any such supply or polluting any stream so as to be a nuisance or danger to health.	
Occupational Safety and Health Act (OSHA), 2007	-Provides for the safety, health and welfare of workers and all persons lawfully present at work places. -Provides for the registration of workplaces. -Outlines safety requirements in use of machinery to prevent accidents and injuries.	-Construction sites require registration as a workplace; -Safety measures are required in use of tools and machinery on site; and -Protection of the workers and general public with any form of interaction with the construction sites is necessary.
The Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005	-Rules provide for the maximum noise exposure levels for workers in places of work and for the provision of protective equipment for those exposed to high noise levels. -Provide that an occupier shall also institute noise reduction measures at the source of noise in the workplace.	-Use of noisy machinery at the construction sites will require provision of PPE to workers. Comply with the regulatory limits (see section 4.3.2).
Water Act 2016	-Provides that subject to the Land Act, 2012, land required for national public water works may be acquired in any manner provided by law for the acquisition of land for public purposes -Compensation on just terms shall be payable by the Government to the owner of the land on which any such works are constructed -Every person in Kenya has the right to clean and safe water in adequate quantities and to reasonable standards of sanitation -Provides that a permit is required for use of water from a water resource; -A person shall not, without authority conferred under this Act throw, convey, cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive matter or thing into or near to any water resource in such manner as to cause, or be likely to cause, pollution of the water resource -Provides for payment for water use as part of the permit conditions	-Compensation shall be necessary for sites acquired to construct water pipelines works .
The Land Act 2012	-Mandates the Land Commission and other public officers to use the following guiding principles and values: -Equitable access to land; security of land rights; - Security of land rights; -Sustainable and productive management of land resources;	The project is likely to acquire land owned by public and private entities and shall ensure that the rights of land owners are secured during the acquisition through the development of RAP.

	-Conservation and protection of ecologically sensitive areas -Provides for the conversion of private land to public land through compulsory acquisition, transfer, surrender or reversion of leasehold interest to Government; -Provides that just compensation shall be paid promptly in full to all persons whose interests in the land have been determined; and -Provides for the creation of a public rights of way (ROW) or wayleave by the National Land Commission.	
The National Museums and Heritage Act 2006	An Act of Parliament to consolidate the law relating to national museums and heritage; to provide for the establishment, control, management and development of national museums and the identification, protection, conservation and transmission of the cultural and natural heritage of Kenya; to repeal the Antiquities and Monuments Act (Cap. 215) and the National Museums Act; and for connected purposes.	This act together with World Bank policy OP 4.11 on Physical Cultural Resources shall be referred to in the event that the project will encounter such materials, chance find procedures have been provided in annex B in this report. The provisions of the Act are mainly enforced by the National Museums of Kenya (NMK).
HIV and AIDS Prevention and Control Act No. 14 of 2006 Revised in 2012	The Act provides for measures for the prevention, management and control of HIV and AIDS, to provide for the protection and promotion of public health and for the appropriate treatment, counseling, support and care of persons infected or at risk of HIV and AIDS infection	The Contractor shall prepare a project implementation plan that contains a comprehensive Programme for: Regular sensitization of all workers on HIV Aids and other Sexually Transmitted Diseases.
Sexual Offences Act, 2006	This Act of Parliament makes provision about sexual offences and aims at prevention and the protection of all persons from harm from unlawful sexual acts. Section 15, 17 and 18 focuses mainly on sexual offenses on minors (children).	The contractor is obligated to put in place mechanisms which are necessary or expedient in order to achieve or promote the objects of this Act, including for instance, a sexual harassment policy.
Child Rights Act (Amendment Bill) 2014	This Act of Parliament makes provision for parental responsibility, fostering, adoption, custody, maintenance, guardianship, care and protection of children. It also makes provision for the administration'of child'en's institutions, gives effect to the principles of the Convention on the Rights of the Child and the African Charter on the Rights and Welfare of the Child. Contractors implementing the various Project components envisaged under the Master Plan Study will be required to comply to provisions of the Act during Project implementation	The contractor shall adhere to the under the below listed measures among others; • The contractor will develop and implement a Children Protection Strategy that will ensures minors are protected against negative impacts associated by the Project including SEA. • All staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behaviour
National Gender and Equality Commission Act (NGEC), 2011	-The over-arching goal for NGEC is to contribute to the reduction of gender inequalities and the discrimination against all women, men, persons with disabilities, the youth, children, the elderly, minorities and marginalized communities.	The provisions of the Act become relevant during hiring of workforce on site in a fair and non-discriminative manner. It may also apply in grievance redress if an aggrieved person escalates a complaint to the commission. The project, through the contractor is expected to consider and hire both male and female gender during the duration of the project.

Employment Act, 2007	-This Act of Parliament prohibits discrimination in labour relations, sexual harassment, forced labour and child labour. It obligates all employers with twenty or more employees to issue a policy statement on sexual harassment.	The contractor shall be guided by the provisions of this Act on matters touching on equality of opportunities in employment, terms of service, age limit and prevention of sexual harassment in the work place.
Kenya Roads Act No. 2 of 2007	Provides for the establishment of the Roads Authorities	The Roads Authorities are key stakeholders in the development of the project. Sections of the transmission pipeline will traverse the roads ROW and consultations have been made with roads authorities. During construction phase, liaison will be made according to conditions laid out in the documentation provided.
The National Construction Authority Act, 2011	The Act provides for the establishment, powers and functions of the National Construction Authority (NCA). For accountability purposes, it requires all contractors to be registered and having valid annual practicing licenses. It also allows for public complaints against the contractor, which may trigger investigation by NCA into the conduct of such a contractor.	The proponent shall only hire a licensed contractor to undertake the construction works. Complaints against the contractor shall first be addressed through the project GRM, and other measures only acting as a last resort.
Valuers Act Cap 532	This Act provides for the registration of valuers and the regulation of the valuation profession and practice in Kenya. Clause 21 of Cap 532 prohibits any person who is not a registered Valuer and whose name does not appear in the register to prepare and submit a valuation report.	The provisions of the Act becomes relevant during compensation of properties among the PAPs in a fair and non-discriminative manner, an RAP to be prepared separately.
Traffic Act 2015	PART V of the Act provides driving and other offences relating to the use of vehicles on roads. The act provides explicit measures related to; Speed of motor vehicles, Penalties in relation to speed, Driving under influence of drink, Driving on pavement, pedestrian walkway, Causing death by driving or obstruction, Reckless driving, Signage and signs to be obeyed, Condition of vehicles, Limitation of loads.	This Act shall be cited in relation to operation of mobile plant and equipment on site. This act is enforced by the Traffic Police Department and the National Transport and Safety Authority (NTSA)
County Government Act 2012	An Act of Parliament to give effect to Chapter Eleven of the Constitution; to provide for county governments' powers, functions and responsibilities to deliver services and for connected purposes.	County Governments in the project to ensure that project is implemented in accordance with the Act and specifically Part VIII on citizen participation.
Labour Relations Act, 1995	An Act of Parliament consolidating the laws relating to trade unions and trade disputes, to provide for the registration, regulation, management and democratization of trade unions and employers organisations or federations, to promote sound labour relations through the protection and promotion of freedom of association, the encouragement of effective collective bargaining and promotion of orderly and expeditious dispute settlement, conducive to social justice and economic development and for connected purposes.	The contractor and CWWDA shall adhere to the requirements of the Act during construction and operation phase.

Building Code	Section 194 requires that where sewer exists, the occupants of the nearby premises shall apply to the local authority for a permit to connect to the sewer line and all the wastewater must be discharged into sewers.	This act may apply due to potential waste water discharge impacts
Coast Water Works Development Agency (CWWDA) Act, 2012	The proposed Investments will be implemented within CWWDA area of operation. CWWDA was created through this Act, mandated with coastal zone development and governance, including coastal planning and coordination of developments. Part I of the CWWDA Act, inter alia defines the CWWDA area of jurisdiction in the entire coast area which includes, Lamu, Tana River, Taita Taveta, Kilifi, Mombasa, and Kwale Counties. The proposed investment plans are planned to be implemented within West Mainland, areas which fall within the jurisdiction of the Coast Water Works Development Agency. Part II of the Act empowers the county government to be in charge of function described in Article 186 of the constitution, (county roads, water, and Sanitation, Health), Part XI of the Act vest the responsibility of planning and development facilitation to the county government with collaboration with national government, this arrangement has been adopted for interventions in order not to conflict with provisions of the Kenyan Constitution.	However, as provided for under the County Government Act of 2012 and Water Act 2016, the Project Proponent is the Coast Water Works Development Agency while Mombasa Water and Sanitation Services Company will be in charge of Operation and Maintenance of the Water Networks after commissioning. The project once commissioned shall be handed over to MOWASSCO which is a water utility, wholly owned by Mombasa County Government for operation and maintenance.
Kenya Roads Act, 2007	Section 49 prohibits the erection, construct or lay or establishment or other things, on or over or below the surface of a road reserve or land in a building restricted area without written permission from the Authority. Gives permission for erecting, constructing, laying or stablishing, any structure or that other thing on or over or below the surface of a road or road reserve.	The pipeline is to be laid within the road reserve (Nairobi-Mombasa) highway and the proponent shall have to obtain written permission from the Authority.
Environment and Land Court Act, 2011	The Environment and Land Court is a superior court established by Article 162(2) of the Constitution of Kenya. The Environment and Land Court Act no.19 of 2011 (ELCA) gives effect to Article 162(2) of the Constitution and the court was established to hear and determine disputes relating to the environment and the use and occupation of, and title to land.	Disputes may arise over the occupation of land earmarked for the pipeline and the court shall hear and determine disputes relating to the environment and the use and occupation of, and title to land.

Source: EMC Consultants

4.3 Applicable Rules and Regulations

The applicable rules and regulations relevant to the assignment are as shown in table 4-3 below.

Table 4-3: Applicable Rules and Regulations

Regulation	Relevance	Applicability to the Project
The Environmental (Impact Assessment and Audit) Regulations, 2003	-Provides the procedure for carrying out Environmental Impact Assessment (EIA) and Environmental Audit (EA). -Provides for the carrying out of an environmental audit study following the commencement of project operations. -Provides for the contents of an EIA and an EA Report.	The EIA to be carried out on the potential interventions shall be carried out in accordance with the regulations. -An initial environmental audit shall also be carried out in the first year of operation of the project
Environmental Management and Coordination (Water Quality) Regulations, 2006	-Provides for the protection of ground and surface water resources. -Provides the water quality standards for sources of domestic water. Regulation 9 of these regulations provide 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 these regulations". The regulations provide for sustainable management of water resources including the prevention of water pollution and protection of water sources (lakes, rivers, streams,' springs, wells, and other water sources). Construction of the dam provides for sustainable management of such water resources.	The quality of water at the potential new intakes must be within the specified range to be sources of domestic water.
Waste Management Regulations, 2006	-Provides for standards for handling, transportation and disposal of various types of wastes including hazardous wastes. -Requirements to ensure waste minimization or cleaner production, waste segregation, recycling or composting. -Provides for licensing of vehicle transporting waste. -Provides for the licensing of waste disposal facilities. 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".	The implementer shall use provisions of this regulation to ensure that waste is handled, stored, transported, and disposed as per this regulation.

Noise and Excessive Vibration Pollution (Control) Regulations, 2009	-Prohibits the generation of unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. -Provides for the maximum noise levels permissible in various environmental set ups such as residential areas, places of worship, commercial areas and mixed residential areas. The Contractor will be required to ensure compliance with the above regulations 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 provide for a maximum of 60 dBA during the day and 35 dBA during the night for a construction site in residential, health and educational facilities, homes for disabled and 75dB (day) and 65dB (night) in all other areas..	-License to emit noise/vibrations in excess of permissible levels to be acquired if necessary. -Sound level limits of 60dB (day) and 35dB (night) to be observed during construction in residential, health and educational facilities, homes for disabled and 75dB (day) and 65dB (night) in all other areas.
The Environmental Management and Coordination (Air Quality Regulations 2014)	-Provides for ambient air quality tolerance limits. -Prohibits air pollution in a manner that exceed specified levels. -Provides for installation of air pollution control systems where pollutants emitted exceed specified limits. -Provides for the control of fugitive emissions within property boundary. -Provides for the control of vehicular emissions. -Provides for prevention of dispersion of visible particulate matter or dust from any material being transported. -Provides for acquisition of an emission license. These regulations provide a framework for the management of plant and equipment emissions of hydrocarbons on site. The regulations require that all plants and equipment on site shall be well serviced to manufacturers' specifications to avoid air pollution, the regulation also requires monitoring of baseline air quality within the construction site and implementation of corrective action where the standards are not complied with.	The contractor shall comlply with the air quality regulations during the contruction phase
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 are marked, undertake annual fire safety audits, etc.	The contractor shall be required to store all flammable materials and liquids safely to avoid the risk of fire.
Medical Examination Rules, 2005	It requires workers on site to undergo regular medical examinations to identify the symptoms of hazardous exposures on the body, especially those who handle food or food products. This is	The contractor shall institute and implement regular medical examinations for its staff at the facility. These will include COVID 19 temperature

	with the sole purpose of monitoring exposure for remedial action.	checkups and drug abuse (at least alcohol on daily basis).
Safety and Health Committee Rules of 2004	These rules require the proponent and contractor (once they employ 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 an 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 shall also make legislation on occupational safety and health available to the Committee.	The contractor shall develop a clearly defined safety and health policy, and bring it to the notice of all employees at the workplace. They are also required to implement and review the policy when the need arises. If construction workers exceed 20, the contractor shall facilitate the formation of an S&H Committee and its operations.
First-Aid Rules, 1977	Rule 7 of First-Aid Rules, 1977 requires that (No person shall be placed in charge of first aid unless he has received adequate training and holds a certificate of competence	The contractor shall conduct first aiders' training for the first time and a refresher training Biannually.

Source: EMC Consultants

4.3.1 National Air Quality Emission Standards

In undertaking the construction activities described above, the Contractor shall comply with the following national regulatory air quality standards and WBG/WHO Air Emission and Ambient Air Quality guidelines, whichever is stringent. Regular monitoring to determine compliance shall be done by the Supervision Consultant and corrective/ mitigation measures applied where necessary.

Table 4-4: Ambient Air Quality Tolerance Limits

Pollutant	**Time Weighted Average**			
		Industrial Area	**Residential, Rural & Other Areas**	**Controlled Areas**
Sulphur oxides (SOX);	Annual Average	80 µg/m^3	60 µg/m^3	15 µg/m^3
	24 hours	125 µg/m^3	80 µg/m^3	30 µg/m^3
	Annual Average		0.019 ppm/50µg/m^3	
	Month Average			
	24 Hours		0.048ppm	
			/125µg/m3	
	Instant Peak		500 µg/m3	
	Instant Peak (10 min)		0.191 ppm	
Oxides of Nitrogen (NOX);	Annual Average	80 µg/m^3	60 µg/m^3	15 µg/m^3
	24 hours	150 µg/m^3	80 µg/m3	30 µg/m^3
	Annual Average		0.2 ppm	
	Month Average		0.3 ppm	
	24 Hours		0.4 ppm	
	One Hour		0.8 ppm	
	Instant Peak		1.4 ppm	

Nitrogen Dioxide	Annual Average	150 µg/m^3	0.05 ppm	
	Month Average		0.08 ppm	
	24 Hours	100 µg/m3	0.1 ppm	
	One Hour		0.2 ppm	
	Instant Peak		0.5 ppm	
Suspended Particulate Matter	Annual Average	360 µg/m^3	140 µg/m3	70 µg/m^3
	24 hours	500 µg/m^3	200 µg/m3	100 µg/m^3
	Annual Average		100 µg/m3	
	24 hours		180 µg/m3	
Respirable Particulate Matter (<10 m) (RPM)	Annual Average	70 µg/m^3	50 µg/m3	50 µg/m^3
	24 hours	150 ug/Nm^3	100 ug/Nm3	75 ug/Nm^3
PM2.5	Annual Average	35 µg/m^3		
	24 hours	75 µg/m^3		
Lead (Pb)	Annual Average	1.0 ug/Nm^3	0.75 ug/Nm3	0.50 µg/m3
	24 hours	1.5 µg/m^3	1.00 µg/m3	0.75 µg/m3
	Month Average		2.5	
Carbon Monoxide (CO)/ carbon dioxide (CO2)	8 hours	5.0 mg/m^3	2.0 mg/m3	1.0 mg/m^3
	1 hour	10.0 mg/m^3	4.0 mg/m3	2.0 mg/m^3
Hydrogen Sulphide	24 hours	150µg/m^3		
	instant Peak	700ppb		
Total VOC	24 hours	600 µg/m^3		

Source: NEMA

Table 4-5: Pollutant versus Time Weighted Average

Pollutant	Time Weighted Average			
		Industrial Area	**Residential, Rural & Other Areas**	**Controlled Areas**
Ozone	1-Hour	200 µg/m	0.12 ppm	
	8-hour (Instant Peak)	120 µg/m	1.25 ppm	

Source: NEMA

Table 4-6: Pollutant Levels for Construction Sites

Pollutant	Time Weighted Average	Property Boundary
Particulate matter (PM)	Annual Average	50 µg/m^3
	24 hours	70 µg/m^3
Oxides of Nitrogen (NOX);	Annual Average	80 µg/m^3
	24 hours	150 µg/m^3
Sulphur oxides (SOX);	Annual Average	50 µg/m^3
	24 hours	125 µg/m^3
Hydrogen Sulphide	24 hours	50 µg/m^3
Lead (Pb)	Annual/24 hours	0.5 – 2.0µg/m^3
Ammonia	24 hours	100 µg/m^3

Source: NEMA

4.3.2 National Noise Emission Guidelines

In undertaking the construction activities described above, the Contractor shall comply with the following national regulatory air quality standards and WBG noise level guidelines, whichever is stringent. Regular monitoring to determine compliance shall be done by the Supervision Consultant and corrective/ mitigation measures applied where necessary.

Table 4-7: National Noise Guidelines

Zone	Maximum Noise level limits dB (A)		Time Frame
	Day	Night	
Places of worship	40	35	
Residential:			
1. Indoors	45	35	Day time: 6.01a.m – 8. 00p.m
2. Outdoors	50	35	
			Night time: 8.01p.m – 6. 00p.m
Mixed Residential (inclusive of Entertainment and commercial places)	55	35	
Commercial	60	35	
Silent arena	40	35	

Source-NEMA

Table 4-8: Noise Levels for construction sites

Facility	Maximum Noise level limits dB (A)		Time Frame
	Day	Night	
Health facilities, Educational Centres and homes for disabled	60	35	Day time: 6.01am-10.00pm Night time: 10.01pm – 6.00am
Residential	60	35	
Commercial	75	65	

Source-NEMA

Table 4-9: Noise levels from a factory or a workshop (Continuous or intermittent noise)

dB(A)	Daily	Weekly
85	8 hours	40 hours
88	4 hours	20 hours
91	2 hours	10 hours
94	1 minute	5 hours
97	30 minutes	2.5 hours
100	15 minutes	1.25 hours
103	7.5	37.5 minutes
106	3.75	18.75 minutes
109	1.875 minutes	9.375 minutes

Source-NEMA

N/B: Noise levels should not exceed a level of Factory/Workshops 85 dB (A) Offices 50 dB (A) Factory/Workshop Compound 75 dB (A).

Table 4-10: Maximum Permissible Noise level for Impact or Impulsive Noise

Sound Level dB(A) Max	Permitted impulses per day
140	100
130	1,000
120	10,000

Source-NEMA

4.3.3 National Water Quality Standards

In supplying water to the West Mainland Residents, MOWASCO shall comply with the following national regulatory drinking water quality standards and WBG water quality guidelines, whichever is stringent. Regular monitoring to determine compliance shall be done by MOWASSCO and corrective/ mitigation measures applied where necessary.

Table 4-11: National Drinking Water Quality Standards

Parameter	units	Guideline Value
Aluminium	mg/L	0.0–5 - 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
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 4-12: 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

Table 4-13: National Wastewater Discharge Standards

Parameters	Maximum Levels Permissible
Suspended solids (mg/L)	250
Total dissolved solids (mg/L)	2000
Temperature ^{0}C	20 -35
pH	6-9
Oil and Grease (mg/L)	where conventional treatment shall be use–d - 10
Oil and Grease (mg/L)	where ponds is a final treatment metho–d - 5
Ammonia Nitrogen (mg/L)	20
Substances with an obnoxious smell	Shall not be discharged into the sewers
Biological Oxygen Demand BOD5 days at 20^{o}C (mg/L)	500
Chemical Oxygen Demand COD (mg/L)	1000
Arsenic (mg/L)	0.02
Mercury (mg/L)	0.05
Lead (mg/L)	1.0
Cadmium (mg/L)	0.5
Chromium VI (mg/L)	0.05
Chromium (Total) (mg/L)	2.0
Copper (mg/L)	1.0
Zinc (mg/L)	5.0
Selenium (mg/L)	0.2
Nickel (mg/L)	3.0
Nitrates (mg/L)	20
Phosphates (mg/L)	30
Cyanide Total (mg/L)	2
Sulphide (mg/L)	2
Phenols (mg/L)	10
Detergents (mg/L)	15
Color Less than	40 Hazen units
Alkyl Mercury Not Detectable	(nd)
Free and saline Ammonia as N (mg/L)	4.0
Calcium Carbide	Nil
Chloroform	Nil
Inflammable solvents	Nil
Radioactive residues	Nil
Degreasing solvents of mono-di-trichloroethylene type	Nil

Source: NEMA

4.4 World Bank Group General Environmental, Health, and Safety (EHS) Guidelines

These are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). These General EHS Guidelines are used in addition to the local guidelines in order to provide mitigation measures for the various environmental and social impacts that will be identified in this report. The main EHS guidelines that shall be used alongside local policies.

4.4.1 Air Quality

WHO reference standards and guidelines including (ambient) for air is shown in tables below.

Table 4-14: WHO Global Reference Standards and Guidelines for NOx PM, Sox.

Parameter	WHO Air Quality Guidelines
Sulphur Dioxide, SO_2	20 µg/m^3
Nitrogen Oxides, NOx as NO_2	200 µg/m^3 (1hr)
Suspended Particulate Matter	200 µg/m^3
PM10	100 µg/m^3
PM2.5	25 µg/m^3
Ozone	100 µg/m^3

Source: WHO, 2021

Table 4-15: WHO Global Ambient Air Quality Guidelines

WHO Ambient Air Quality Guidelines 7,8		
	Averaging Period	Guideline value in mg/m3
Sulfur dioxide (SO_2)	24-hour 10 minutes	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) 500 (guideline)
Nitrogen dioxide (NO_2)	1-year 1-hour	40 (guideline) 200 (guideline)
Particulate Matter PM 10	1-year 24-hour	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline) 150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter PM2.5	1-year 24-hour	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline) 75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

Source: WHO, 2021

4.4.2 Hazardous Materials Management

These guidelines will mainly govern the handling and disposal of hazardous materials, under this project the major hazardous material is used engine oil, which if not handled properly can have a negative impact on the health of the workers and the local community.

4.4.3 Solid Waste Management

All construction works are expected to produce one or more forms of waste. The West Mainland Pipeline project is no exception. Construction wastes are expected from the Contractor's site. The Contractor shall have to prepare a waste management plan using these guidelines that conform to the local legal framework provided in this chapter. Wastes shall be disposed of as per waste management regulations, 2006.

4.4.4 Noise

The use of several pieces of equipment is bound to generate some level of noise, which is bound to have a negative impact on the surrounding environment and in particular sensitive receptors. These impacts will be short-lived during the construction and operation phase of the project, and if minimal mechanization is employed the impacts can be reduced further. The guidelines also provide the maximum noise levels, which the Contractor shall strive to adhere to. The guidelines also call for baseline and annual monitoring of noise generation within the Contractor's site to establish compliance with the guidelines and local regulations. Equipment shall be well serviced to minimize noise, idle equipment shall be switched off, employees must be provided with earplugs, and equipment shall be operated with noise and excessive vibrations, 2009 acceptable limits.

Table 4-16: Noise Level Guidelines

Noise Level Guidelines		
	One Hour LAeq (dBA)	
Receptor	Daytime 07:0–0 - 22:00	Nighttime 22:0–0 - 07:00
Residential; institutional; educational	55	45
Industrial; commercial	70	70

Source: WBG

4.5 Applicable World Bank Operational Policies

CWWDA prepared a number of framework safeguards instruments including ESMF and RPF as these were deemed applicable and necessary to guide in preparation of site-specific safeguard instruments when the locations and designs were availed. The applicable WB safeguards triggered by the project are discussed below.

Table 4-17: Applicable/Triggered World Bank Policies

Safeguards Policies	Provision	Relevance to the Project
World Bank OP 4.01 on Environmental Assessment	-Provides for environmental assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making	-An Environmental and Social Impact Assessment of the construction of pipeline is required to be carried out.

World Bank OP 4.12 on Involuntary resettlement	-Provides measures to mitigate against impoverishment risks associated with Involuntary Resettlement and the restoration or improvement of income earning capacity of the Project Affected People (PAP)	-ESIA proposes that a RAP be conducted as there are PAPs in the project area who may be physically and or economically displaced.
World Bank OP 4.11 on Physical Cultural Resources	-Provides for measures to protect cultural heritage from the adverse impacts of project activities and support its preservation; -Provides for measures to promote the equitable sharing of benefits from the use of cultural heritage; and -Provide for measures to address impacts on physical cultural resources in projects proposed for Bank financing, as an integral part of the environmental assessment (EA) process.	-ESIA shall propose measures for protection of identified cultural resources. During the field study, no physical cultural resources were identified along the project routing. A Chance Finds Procedure is annexed in annex B to this report.

4.6 Applicable World Bank Environmental and Social Standards

The ESSs are technical reference documents which form part of the World Bank's 2017 Environmental and Social framework (ESF)The ESF has a set of 10 Environmental and Social Standards (ESSs) guidelines that are designed to ensure that all social and environmental risks and impacts of development project are identified and managed effectively. The World Bank's Environmental and Social Framework (ESF) requires the Bank and Borrowers to better manage environmental and social risks and impacts of projects and to improve development outcomes.

ESS1: Assessment and Management of Environmental and Social Risks and Impacts
ESS1 prescribes that the borrower (CWWDA) will assess, manage, and monitor the environmental and social risks and impacts of the project throughout the project life cycle so as to meet the requirements of the ESSs in a manner and within a timeframe acceptable to the Bank. In order to meet this requirement, the borrower will: (a) Conduct an environmental and social assessment of the proposed project, including stakeholder engagement; (b) Undertake stakeholder engagement and disclose appropriate information in accordance with ESS10; (c) and Conduct monitoring and reporting on the environmental and social performance of the project against the ESSs.

ESS2: Labour and Working Conditions,
This ESS recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. However, the ESS prescribes that the project proponent should promote sound worker management relationships and enhance the development benefits of the project by treating workers in the project fairly and providing safe healthy working conditions. The activities in this project may have high potential occupational health and safety risks.

ESS3: Resource Efficiency and 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. This ESS sets out the requirements to address resource efficiency and pollution prevention and Management throughout the project life cycle consistent with GIIP. The construction, operation and maintenance phase of this project may lead to pollution.

ESS4: Community Health and Safety

ESS4 addresses the health, safety, and security risks and impacts on project-affected communities and the corresponding responsibility of Borrowers to avoid or minimize such risks and impacts, with particular attention to people who, because of their circumstances, may be vulnerable. The project is expected to result in health and safety impacts to the community in the project area, such as impacts associated to exposure to dust, noise and vibration, an increase in traffic, or violent behaviors related to labor influx.

ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

The overall objectives of the World Bank's ESS 5 are to avoid land acquisition and involuntary resettlement where feasible, or to minimize resettlement while exploring all viable alternatives. Where it is not possible to avoid resettlement, activities will be conceived and executed as sustainable development programs, providing sufficient investment to enable the persons displaced by the project to share in the project benefits. The project activities will lead to potential land acquisition due to the acquisition of land for the installation substation and transmission network.

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. ESS6 recognizes the importance of maintaining core ecological functions of habitats, including forests, and the biodiversity they support. This ESS also addresses sustainable management of primary production and harvesting of living natural resources. ESS6 recognizes the need to consider the livelihood of project-affected parties, including Indigenous Peoples, whose access to, or use of, biodiversity or living natural resources may be affected by a project. The project is not likely to impact biodiversity or living natural resources.

ESS7 Indigenous Peoples/Sub-Saharan Historically Underserved Traditional Local Communities

This ESS applies to a distinct social and cultural group identified in accordance with paragraphs 8 and 9 of this ESS. There are no communities identified so far meeting the requirements of ESS7 in the project area.

ESS8: Cultural Heritage

This ESS recognizes that cultural heritage, in its many manifestations, is important as a sourced of valuable scientific and historical information, as an economic and social asset for development, and as an integral part of peoples' cultural identity and practice. The objective of this ESS is to protect cultural heritage from the adverse risks and impacts of

project activities and to promote meaningful consultations with stakeholders regarding cultural heritage. A Chance Find Procedure is recommended for this project.

ESS10: Stakeholder Engagement and Information Disclosure
ESS 10 applies as it addresses the importance of open and transparent stakeholder engagement, which is essential in improving the environmental and social sustainability of the project. Stakeholder engagement must be a socially inclusive process conducted throughout the project life cycle. Where properly designed and implemented, it supports the development of strong, constructive responsive relationships that are important for the successful management of a project's environmental and social risks. Construction activities will impact the social and economic life of people and their environment.

4.7 International Conventions

Relevant international agreements, treaties, and conventions that have a social and/or environmental aspect, to which Kenya is a signatory or has acceded to/ratified and which will guide project implementation, are detailed in Table 4-18 below.

Table 4-18: International Conventions

Convention	Relevance
African Convention for the Conservation of Nature and Natural Resources (2003)	Objective: To encourage conservation, utilization and development of soil, water, flora and fauna for the present and future welfare of mankind, from an economic, nutritional, scientific, educational, cultural and aesthetic point of view. The project shall adopt the measures necessary to ensure conservation, utilization and development of soil, water, floral and faunal resources in accordance with scientific principles and with due regard to the best interest of the people.
Convention on Biological Diversity (1992)	Objective: The convention has three main objectives: (1) To conserve biological diversity; (2) To sustainably use the components of biological diversity, and (3) To provide fair and equitable access to the benefits of using genetic resources. The project is committed to promoting the objectives of the CBD in every stage of the project implementation.
Convention on the Conservation of Migratory Species of Wild Animals	Objective: Conservation of migratory species of wild animals and their habitats throughout their entire range. Species that are endangered are granted the highest degree of protection. Within the project area/construction corridor there are no fauna species that are categorised as Critically Endangered (CR) or Endangered (EN) or migratory species
Convention on Wetlands of International Importance especially Waterfowl Habitat (Ramsar Convention, 1971)	Objective: Conservation and wise use of all wetlands. As defined by the convention, wetlands include a wide variety of habitats such as marshes, peatlands, floodplains, rivers and lakes, and costal areas such as saltmarshes, mangroves, seagrass beds, coral reefs and other marine areas no deeper

	than six-meters at low tide, as well as human-made wetlands such as waste-water treatment ponds and reservoirs. This ESIA has considered any potential impacts on wetlands as defined by the Ramsar Convention.
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (1998)	Objectives: To regulate the transboundary movements of hazardous waste chemicals, especially pesticides in order to protect human health and the environment from potential harm. The ESIA has considered the objectives of the Rotterdam Convention in planning and implementing the project. In particular, the project shall l ensure that no chemicals contrary to the wishes of the project country are imported.
Basel Convention on Hazardous Waste (1989)	Objective: To minimize the movements of hazardous waste between nations, and specifically to prevent transport of toxic waste from developed to less developed countries. The project does not anticipate that there will be hazardous waste generated that will be transported or received from a different country. To the extent there is any transfer of hazardous waste, the project shall ensure that it complies with the Basel Convention.
Bamako Convention (1991)	Objective: To strictly regulate the transboundary movement of hazardous wastes to and within Africa. Like the Basel Convention, the project does not anticipate that there will be hazardous waste generated that will be transported or received from a different country. To the extent there is any transfer of hazardous waste, the project shall ensure that it complies with the Bamako Convention.
Convention concerning the Protection of the World Cultural and Natural Heritage (1972).	Objective: To identify, conserve and protect international cultural and natural heritage sites, especially those that have been determined to possess outstanding universal value. By applying international standards such as World Bank O.P 4.11 regarding Physical Cultural Resources to any identification and management of cultural heritage aspects during project development, the project shall comply with the objectives of the convention. A Chance Finds Procedure has been developed for this project.
Abolition of Forced Labour Convention, 1957 (No. 105)	Objective: To suppress the use of forced or compulsory labour independent of the sector or type of work. And to ensure that the use of forced labour is punishable as a criminal offense and that penalties are adequate and strictly enforced. The use of forced or compulsory labour is prohibited in every stage of the project. The project human resource (HR) policies and procedures are developed and implemented to ensure that there is no use of forced, compulsory or coerced labour including compliance with Kenya employment laws.
ILO Minimum Age Convention, 1973 (No. 138)	Objective: To regulate the use of child labour by requiring Parties to set a minimum age for admission to employment

	or work to a level consistent with the fullest physical and mental development f young persons. The project will ensure that employment policies include prohibitions on the employment of children below and that there is strict adherence to such policies.
ILO Worst Forms of Child Labour Convention, 1999(No. 182)	Objective: To eliminate the worst forms of child labour, including slavery, forced labour and trafficking in human beings. The project shall ensure that employment policies include prohibitions on the employment of children. The project shall further undertake due diligence to identify and assess risks, including the worst forms of child labour in its supply chains.
ILO Freedom of Association and Protection of the Right to Organize Convention, 1948 (No. 87)	Objective: To protect the rights of employees and employers to establish and join an organization of their choice without prior authorization. The project shall ensure that workers' freedom of association and right to organize is protected and shall not be interfered with. Workers will not be punished or reprimanded to organize and associate as they choose.
ILO Discrimination (Employment and Occupation) Convention, 1958 (No. 111)	Objective: Requires Parties to enact legislation that prohibits all discrimination and exclusion on any basis including race, colour, sex, religion, political opinion, national or social origin and repeal legislation that is not based on equal opportunities. The project shall ensure that there is no discrimination or exclusion, and everyone is guaranteed an equal opportunity in employment.
International Convention on the Elimination of All Forms of Racial Discrimination: 1969.	Objective: To eliminate all forms of racial discrimination and to promote understanding amongst all races. The project shall ensure that all workplace racial discrimination is expressly forbidden. All workers will be educated on racial biases and discrimination to ensure compliance with the convention.
Convention on the Elimination of All Forms of Discrimination against Women :1981 (CEDAW)	Objective: To eliminate discrimination against women and girls in all areas and to promote women's and girl's equal rights. The project shall ensure that women and girls are not discriminated. The HR policies and practices for the project shall forbid any discrimination against women and girls and workers shall be educated on workplace discrimination against women and girls.
Convention on the Rights of the Child, 1990	Objective: Aims to protect the rights of children worldwide. And defines a child as any human being under the age of 18. It calls on Parties to take appropriate measures to protect the human rights of children. The project shall ensure that employment policies include prohibitions on the employment of children in accordance with the employment laws of Kenya.

Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment:1987	Objective: Obligates Parties to the treaty to prohibit and prevent torture and cruel, inhuman or degrading treatment or punishment in all circumstances. The project shall ensure that torture in all workplaces is expressly forbidden.
International Covenant on Economic, Social and Cultural Rights, 1976	Objective: to protect and ensure the enjoyment of economic, social, and cultural rights, including the rights to: education, fair and just working conditions, adequate standard of living, the highest attainable standard of health, and social security. The project shall ensure that economic, social, and cultural rights are respected in the implementation.
International Covenant on Civil and Political Rights,1976	Objective: To protect and preserve civil and political rights such as the right to life and human dignity, equality before the law, freedom of speech, assembly and association religious freedom, freedom from torture, ill treatment, and arbitrary detention, gender equality, the right to a fair trial, and minority rights. The project shall ensure that all civil and political rights are observed and honored during implementation.
Convention on the Rights of Persons with Disabilities	Objective: To promote and protect the rights and dignity of people with disabilities and ensure that persons with disabilities enjoy full equality under the law. The project is committed to ensuring that there is no discrimination of persons with disabilities in the workplace. The project shall also comply with the legal framework for persons with disabilities and will provide any reasonable accommodation to persons with disabilities who are employed by the project.
The African Charter on Human and Peoples' Rights (African Charter)	Objective: To promote and protect human rights and basic freedoms in the African continent. The project shall ensure that civil, political and human rights are observed in the implementation.
The African Charter on the Rights and Welfare of the Child	Objective: To promote and protect the rights of children in Africa by setting values underlying the protection of the rights and welfare of children in Africa, and provides for the entitlements of children, the responsibility of children and the duties of African countries to make these entitlements and protections a reality. The project shall ensure that the rights of children as provided in the Charter are honored and that no use of child labour is allowed.
The Protocol to the African Charter on the Rights of Women in Africa (Maputo Protocol)	Objective: To protect and promote women rights including the right to political participation, social and political equality with men, improved autonomy in their reproductive health decisions, and an end to child marriage and female genital mutilation.

	The project shall safeguard women rights and shall ensure that the rights are observed in the course of project implementation.

4.8 Institutional Frameworks

4.8.1 Ministry of Water, Sanitation and Irrigation

The Ministry of Water, Sanitation and Irrigation (MWSI) is responsible for the overall management of Water Resources and formulation of Regulations and Policies for the Water Sector. The Ministry was established in January 2003 with the goal of achieving the following strategic objectives:

- Accelerating the implementation of water sector reforms
- Improving sustainable management of water resources
- Improving the provision of water and sewerage services
- Improving utilization of land through irrigation and land reclamation
- Strengthening institutions in the ministry and the water sector
- Mobilizing resources and promoting efficiency in their utilization
- Improving management and access to water resources information

The Water Act 2016 mandates MWSI with the responsibility to set up institutions such as CWWDA, the Water Tribunal, the Water Sector Trust Fund (WSTF), Water Resources Authority (WRA) and the National Water Harvesting and Storage Authority (NWHSA) to deal with disputes, provide funds for development of water works and to manage the National public water works for water resource management and flood control respectively.

4.8.2 The National Environment Management Authority

The responsibility of the National Environmental Management Authority (NEMA) is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of government in the implementation of all policies relating to the environment.

4.8.3 The National Environmental Complaints Committee

The Act (EMCA) has also established a Public Complaints Committee, which provides the administrative mechanism for addressing environmental harm. The Committee has the mandate to investigate complaints relating to environmental damage and degradation. Its members include representatives from the Law Society of Kenya, NGOs, and the business community.

4.8.4 The County Environmental Committee

County Environmental Action Plan Committee is charged with the responsibility of preparing a provincial environmental Action based on the county environmental plan. The county Environmental action plans are further compiled at the national level.

4.8.5 Directorate of Occupational Health and Safety Services

The institution will be task for registration of the construction site as a workplace and enforcing compliance with Occupational Health and Safety Regulations at the construction site.

4.8.6 National Land Commission

The National Land Commission (NLC) 2012 will undertake compensation. NLC is an independent government commission whose establishment was provided for by the Constitution of Kenya, 2010 to, amongst other things, manage public land on behalf of the national and county governments, initiate investigations into present or historical land injustices and recommend appropriate redress, and monitor and have oversight responsibilities over land use planning throughout the country.

5 ENVIRONMENTAL AND SOCIAL BASELINE

5.1 Introduction

This chapter provides a description of the current baseline conditions in the Project Area of Influence (AoI). The baseline characteristics of the biophysical and socio-economic conditions are used as the basis of prediction of possible effects and to monitor changes during construction and operation. The baseline bio-physical and socio-economic information has been presented by County traversed by the transmission line.

5.2 Overview of Field Surveys

Surveys were undertaken by a combined physical, biological, and social study team which collected and categorized both primary and secondary data. To plan the survey, maps of the Project AoI were created, and the key environmental and social resources were located and analysed. This analysis was used to develop the survey plan and target locations. The following surveys were performed during field work activities:

Box 5-1: Overview of Field Surveys

- Flora and habitats (primary data collection, including vegetation mapping ground-truthing);
- Fauna (primary data collection);
- Noise (primary data collection);
- Water resources, soils, land use and landscape and
- Ground-truthing along the corridor of the water transmission line (i.e. 6m wide corridor).
- Stakeholder identification;
- Social demographics and other characteristics (secondary and primary data collection);

During the surveys, a number of engagements were held with stakeholders at the community level (Project disclosure meetings, village profiles, focus group discussions) and government level.

5.3 Bio-Physical Baseline Studies

Under the scope of the biophysical components, field visits to several pre-identified locations were undertaken in order to survey the baseline conditions and identify the main potential impacts of the mentioned project from the start to the end of the transmission line including the reservoir areas. In order to better systematize the data collection and subsequent analysis, in view of the description of the ecosystems to be crossed and vulnerability and accessibility, all possible routes within the 6 m corridor were assessed. Before the survey, a literature review was undertaken on the vegetation cover of the area under assessment, and together with analyses of satellite images, this information was used as a basis for the fieldwork. After the desktop analysis, field visits were held in order to collect data for ground-trothing. The different vegetation/habitat types as well as the flora component were analyzed. The occurrences of the main plant and animal species (mammals, birds, reptiles and amphibians) were recorded with the assistance of field guides, scientific references, satellite material and other bibliographic resources available.

5.4 Social Baseline Studies

The geographical focus of this baseline is a socio-economic Study Area which was defined a selection of areas representative of the project route. The focus of this socio-economic baseline was on a selection of communities which will directly benefit from the proposed project and that can be used to measure and monitor positive and negative impacts. The main sources of data are:

- The 2019 Census of Population and Housing Census. Most of the data reported for the socioeconomic baseline is from this source.
- Community socioeconomic survey conducted between in October and December 2022
- Community consultations conducted between in October and November 2022.

As such, the socioeconomic information presented in the baseline focuses to the extent possible on the Study Area based on a combination of data collected during the field visits and additional secondary sources. Information is provided at a higher level (county and national) as applicable when local level information is not available or when the general information applies at the local level. It should be noted that specific information relative to land affected households (land ownership status, asset inventories, etc.) was not included in the scope of the ESIA fieldwork. This information has been collected as part of the RAP preparation process.

5.5 Kwale County Bio-physical Environment

5.5.1 Location and Size

Kwale County is one of the 47 counties in Kenya. It is located in south coast of Kenya, it borders the Republic of Tanzania to the South West, and the following Counties; Taita Taveta to the West, Kilifi to the North, Mombasa to the North East and the Indian Ocean to the East. Kwale County covers a total surface area of 8,270.2 km^2 and accounts for 1.42 per cent of Kenya`s total surface area.

5.5.2 Administrative and Political Units

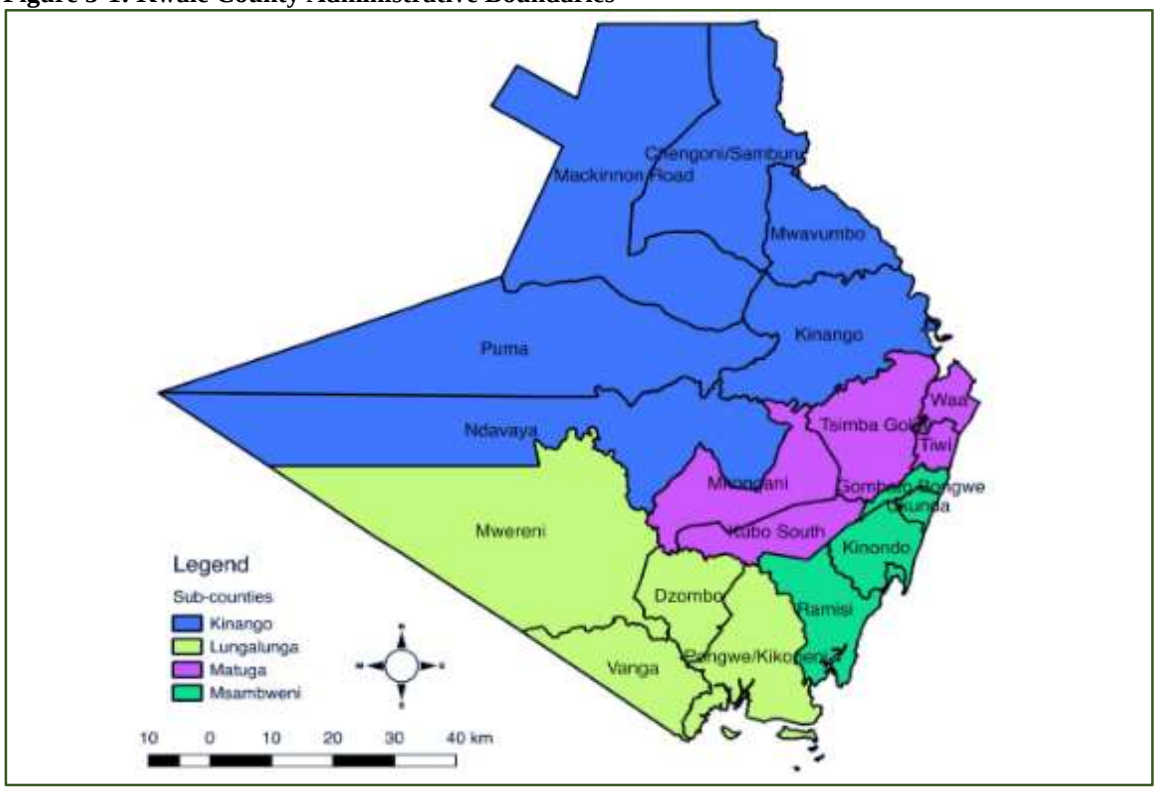
Kwale County comprises of 5 administrative sub-counties (KNBS, 2019) namely Kinango, Lunga Lunga, Msambweni, Samburu and Matuga (Kwale).

Table 5-1: Kwale County's Electoral Wards by Constituency

No.	Sub-County	Wards
1.	Kinango	Ndavaya, Puma, Mackinon Road, Chengoni/Samburu, Mwavumbo, Kinango
2.	Lunga Lunga	Pongwe/Kikoneni, Dzombo, Mwereni, Ramisi
3.	Msambweni	Gombato, Bongwe, Ukunda, Kinindo, Ramisi
4.	Matuga	Tsimba-Golini,Waa-Ng'ombeni,Tiwi,Kubo-south, Mkongani
5.	Samburu	Kasemeni, Mwamdudu

Figure 5-1 below shows administrative units in the county and a map of the project site. The project site lies in Kasemeni location.

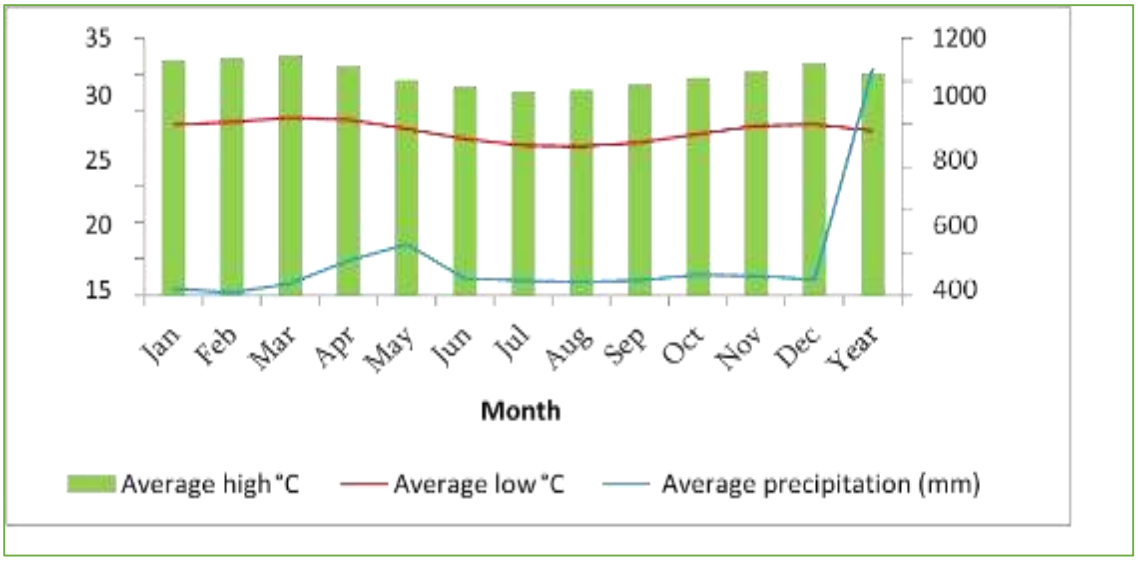
Figure 5-1: Kwale County Administrative Boundaries



5.5.3 Climate and Meteorology

The county has monsoon type of climate which is hot and dry from January to April/May, while the period from June to August is the coolest in the year. Rainfall is bi-modal with short rains being experienced from October to December, while the long rains are experienced from March/April to July. The total annual precipitation varies from 900 mm to 1500 mm per annum along the coast to 500 mm to 600 mm per annum in the hinterland. The average annual rainfall ranges from 600mm in the hinterland to 1200 mm at the coastal belt. The coastal belt receives an average annual rainfall of a 1000mm with a marked decrease in intensity to the north and the hinterland. Average temperature ranges from 26.3°C to 26.6°C in the coastal lowlands, 25°C to 26.6ºC in Shimba Hills, and 24.6°C to 27.5°C in the hinterland. Annual average precipitation of Kinango Sub County (where the project is sited) is 852mm. The precipitation is highest in the months of April and May while no or little precipitation occurs from March to December. Dependable annual rainfall is 610 mm.

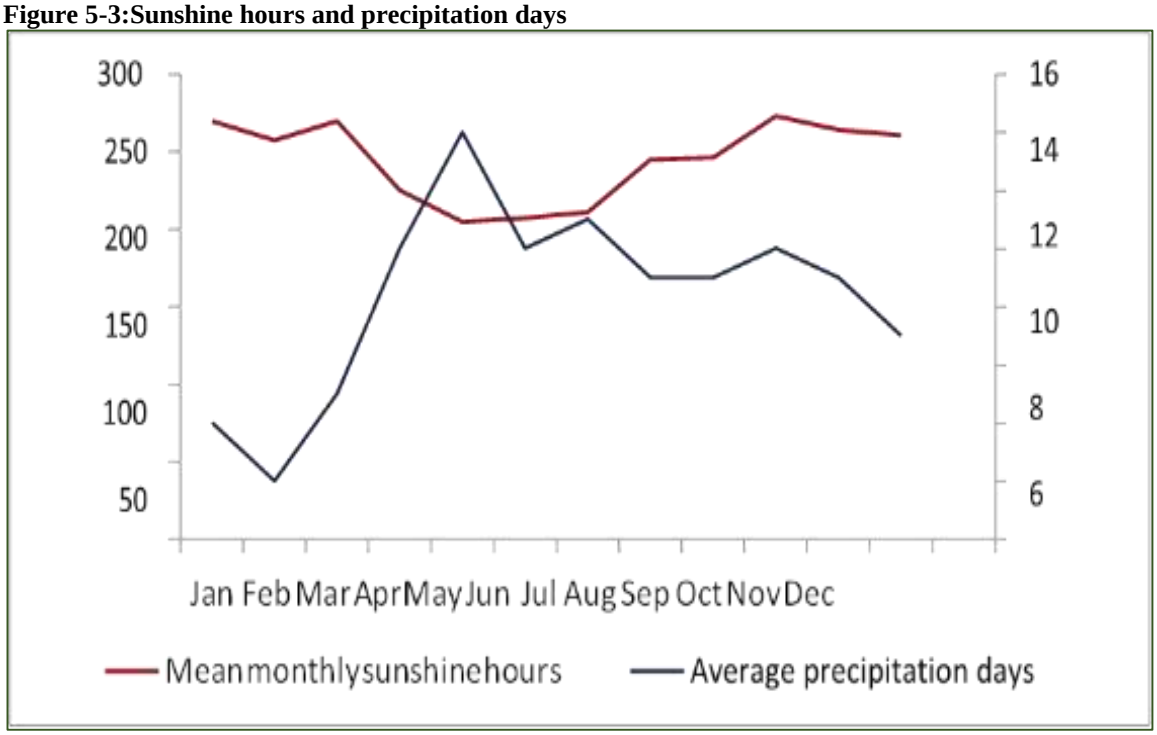
Figure 5-2: Kwale Temperature and Rainfall



Source: Kenya Meteorological Data

The average annual temperature in the area is usually above 28°C. The months of January and February are the driest with a maximum average temperature of 33°C. The coldest month is usually July with a minimum of 23°C. The area is generally hot and humid all the year round with an average humidity at noon of about 65% due to a high evaporation rate. The month of February has the lowest number of sunshine hours (high precipitation) while may has the highest (lowest precipitation) as shown in **Figure 5-3.**

Figure 5-3:Sunshine hours and precipitation days



Source: Kenya Meteorological Data

5.5.4 Baseline Ambient Environmental Measurements

Tables **5-2** to **5-5** below are the results of ambient air and noise measurements conducted to understand the baseline situation of the project area specifically in areas with sensitive receptors that may be affected by the project construction activities.

5.5.4.1 Ambient Air Quality Measurements

There are 2 sensitive receptors along the project routes that may be adversely affected by the air emissions from the project (a school and mosque).

Table 5-2: Ambient Air Emission: – PM10

Location	GPS Coordinates		Proxy	PM 10 (ug/m3	Air Quality Guidelines	
	Easting (m)	Northing(m)			WHO	EMCA(2014)
Fulugani Primary School	558826.13E	9560001.92S	MP1	33	50	50
Prevailing Weather Conditions						
Sunlight			Sunny			
Precipitation			None			
Wind			Still			
Temperature			28 Degrees Celsius			
Cloud cover			Sparse			
Date			13th November 2022			
Duration of measurements			1hour			

Source: Field Data

Table 5-3: Ambient Air Emission– Sulphur Dioxide, SO2

Location	GPS Coordinates		Proxy	PM 10 (ug/m3	Air Quality Guidelines	
	Easting (m)	Northing(m)			WHO	EMCA(2014)
Fulugani Primary School	558826.13E	9560001.92S	MP1	<8.1	20 µg/m^3 24hrs	80µg/m^3 24hrs
Prevailing Weather Conditions						
Sunlight			Sunny			
Precipitation			None			
Wind			Still			
Temperature			28 Degrees Celsius			
Cloud Cover			Sparse			
Date			14th November January 2022			
Duration of Measurements			1hour			

Source: Field Data

Table 5-4: Ambient Air Emission– Nitrogen Dioxide

Location	Proxy	Time	NO2 (µg/m3)	WHO AQG	EMCA (Air Qual. Reg. 2014)
Fulugani Primary School	MP1	08.00-09.00am	16	40 µg/m3 Annual 200 µg/m3 1hr average	80 µg/m3 24hrs
	MP3	12.00-13.00pm	29		
Prevailing Weather Conditions					

Sunlight	Sunny
Precipitation	None
Wind	Still
Temperature	28 Degrees Celsius
Date	16th October 2022
Duration of Measurements	1hour

Source: Field Data

Figure 5-4 below shows the sensitive receptors (educational facility and religious institution, chainage 2+500) along the proposed project routes and within a buffer zone of 200ms.

Figure 5-4: Schools

5.5.5 Ambient Noise Emission Measurements

Table 5-5: Ambient Noise Level

Location	Proxy	LA Eq	LA Max	LA Min
Fulugani Primary School	MP1	42.1	48.1	40.8
Prevailing Weather Conditions				
Sunlight		Sunny		
Precipitation		None		
Wind		Still		
Temperature		30 ^{0} C		

Source: Field Data

Figure 5-5: Environmental Measurement Equipment in the field

5.5.6 Topography

Kwale County has four major topographic features namely the Coastal Plain, the Foot Plateau, the Coastal Uplands and the Nyika Plateau. The coastline in Kwale County is about 250 km. This strip of land consists of corals, sands and alluvial deposits. The Foot Plateau, behind the Coastal Plain lies at an altitude of between 60 and 135 m above sea level. The plateau has a flat plain surface with high potential permeable sand hills and loamy soils. This zone is composed of Jurassic rocks and sandy hills consisting of Magarini sands ideal for sugar cane growing. The Coastal Uplands, commonly known as Shimba Hills is an area of medium to high agricultural potential. The area rises steeply from the foot plateau at an altitude of between 135 to 462 m above the sea level. This zone is made up of sand stones hills that include the Shimba Hills (420m), Tsimba (350 m), Mrima (323 m) and Dzombo (462 m). The Nyika Plateau, also referred to as the hinterland is a semi-arid area with largely poor soil that rises gradually from about 180 m on the western boundary of the county. The region is characterized by basement rocks system with exception of occasional patches of reddish sand soils and occupies over a half of the county.

Mwache River is the main determinant of the drainage in the project area and the immediate adjoining areas. The slope is predominantly west east towards the sea shoreline (Mwache River discharges into Mwache Creek) from Taita hills in the west where Mwache River originates. Kombeni River basin to the north of the Mwache river basin has similar characteristics (discharging into Tudor Creek just north of Changamwe). The two rivers and their tributary streams are seasonal but carry high storm water flows during rains (combined catchment will be reported from the hydrology report). The general topography is relatively flat with breaks of medium valleys with seasonal flows. The local landforms are influenced by the rivers and mild slopes towards the flood plans.

The topography of the project area comprises of a ridge line on which the Nairobi-Mombasa Highway is located, with the ground sloping on both sides to low points of up to sea level. The ridge line (Nairobi–Mombasa highway) also slopes from Mazeras at 160m amsl to 65m at the Changamwe reservoirs, and further to sea level at Makupa Bridge.

5.5.7 Geology

Geologically, the area is underlain by four groups of rocks. The basement rocks which occur as gneisses, schists, quartzite and granitoid, and crystalline limestone found in the North West. The Karoo sediments also called Duruma sandstones comprise of the Taru formation, the Maji- ya-Chumvi formation, the Mariakani formation and the Mazeras formation which cover the middle strip of the county to the foot of Shimba Hills. Thirdly, the rock underlying the Coastal strip (the Jurassic–Cretaceous Rocks) includes Kambe limestone found between the North East of Shimba Hills and on the Western shores of Mombasa Island. Lastly, there are recent sediments and deposits that consist of the Marafa and the Magarini formations.

The soils along the project area of influence gradually changes to 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.

5.5.8 Hydrology and Hydrogeology

Generally, the county is well drained by seven major rivers among them Ramisi, Marere, Pemba, Mkurumuji, Umba, Mwachema and the Mwache River. It is also served by numerous minor streams. Of the seven (7) rivers, three (3) are permanent. All Kwale rivers flow into the Indian Ocean. Kwale has great groundwater potential because of its abundant rainfall and porosity of the underlying rock. The water quality is largely determined by the geology of the area. The Duruma sandstone series occupy a great part of the middle area of the region, Kinango and Samburu Divisions. Most of underground water in this series is saline and found in greater depths. The coastal belt has a great potential for potable underground water with six main underground water catchments and/or reservoir.

- **Tiwi Catchment:** The aquifer has been developed for public water supply purposes since the mid- 1970s and is currently one of the two major sources in the South Coast the other being Marere springs south of Kwale town. The aquifer has a width of 20 km with good quality water. The aquifer faces potential pollution threats from sand harvesting which may remove enough of the overlying unsaturated material to increase the risk of pollution by direct recharge of dirty water and urban development which relies on site sanitation systems (pit latrines or septic tanks). The pipeline is in the Tiwi catchment.
- **Lunga Lunga Catchment:** This covers about 2 km^2 with a potential capacity of 30,000m3/d. Out of the total capacity, only 13,720m^3/hr can be obstructed without changes in water quality during the dry spell. Currently 17,800m3/day is obstructed through 251 shallow boreholes.
- **Diani Catchment**: The aquifer covers 19 km^2 and has a very low recharge due to high clay content which decreases permeability. A number of shallow boreholes have been drilled in the area.
- **Ramisi Catchment:** This is a very large catchment that reaches westward to include outcrops of the Duruma sandstone series. Due to this reason, surface runoff are saline.
- **Mwachema Catchment**: It has low potential for fresh water due to increased clay content and sea water intrusion.
- **Umba and Mwena Catchments:** The underlying geology of this area consists of the Duruma sandstone series, which is highly mineralized. Water in these catchments are therefore saline.

The dry streams collect 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, 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 while Mnyenzeni river also from the southwest immediately upstream of the dam axis. There are also numerous dry surface drains into Mwache River but seemingly flows with water only during rainy seasons. The water resources along the proposed pipeline route has varying water quality Water quality from one water body to the other with a particular difference between the fresh water and the brackish water from Mwache Creek. The general water quality could be summarized as indicated in Table 5-6 below. The transmission pipeline does not cross any surface water body in this County.

Table 5-6: Water quality parameters

Parameter	Description
pH	Water generally neutral in river and the creek (6.0 –9.0)
Colour	Surface water is highly colored 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

5.5.9 Soils

The project site 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. The area is characterized by reddish brown, well drained sandy soils. They are fertile with no signs of pollution. The site lies at an altitude of about 30 m amsl. The area has a flat topography with a very gentle slope towards the Indian Ocean coastline.

5.5.10 Groundwater

Kwale has great groundwater potential because of its abundant rainfall and porosity of the underlying rock. The water quality is largely determined by the geology of the area. The Duruma sandstone series occupy a great part of the middle area of the region, Kinango and Samburu Divisions. Most of underground water in this series is saline and found in greater depths. Ground water potential is a function of rainfall and porosity of the underlying rock. Its quality is largely determined by the geology of the area. The coastal belt has a great potential of potable underground water with six main underground water catchments and/or reservoir. This includes the Tiwi catchment whose aquifer has a width of 20 Km^{-2} and has a through flow of 42,000m^2/hr. Others are the Msambweni catchment whose aquifer has a width of 42Km^2 with a through flow of 27,440m^3/hr. Further the Diani catchment has an aquifer that covers 19 Km^2 with a through flow of 1400m^3/hr. The Ramisi Catchment a very large catchment that reaches westward to include outcrops of the Duruma sandstone series. While the Mwachema catchment is also significant, it has low potential for fresh water due to increased clay content and sea water intrusion. Further, the Umba

and Mwena catchment consists of the Duruma sandstone series, which is highly mineralized. Water in these catchments, therefore, is relatively saline.

5.5.11Land Ownership

Land ownership along the project area of influence is a mix of registered subdivided parcels and clan based and this influences the settlement trends. Land use is mainly subsistence farming with very low land productivity value, due to poor rainfall, poor soil quality and the people's culture.

5.5.12 Land Use

The settlement pattern in the Coastal Kenya is influenced by infrastructure network such as roads, water, electricity, availability and accessibility of areas of gainful employment, availability of cheap housing, security and land tenure. Due to these factors, settlement in the coast is characterized by rapid urbanization and mushrooming of unplanned settlements due to high population growth rate and shortage of quality and affordable housing. The informal settlements lack proper access roads, drainage systems, water and provision of social amenities such as schools.

Figure 5-6: Map showing land use in the area

Along the project site, settlement villages were observed along the murram road connecting Kasemeni location with Mombasa road. The villages include; Mwamdudu and Buni **Figure 5-7** below illustrates nature of houses with the Project area. The main crops under cultivation in the county include cassava, maize, vegetables, millet and sorghum. These are most preferred due to their resistance to diseases and pests. The total acreage under food crop stands at 400 ha while the total acreage under cash crop is 500 ha. Livestock keeping and fishing is also practiced in the County.

Figure 5-7: Housing types in the project area

5.6 Biological Environment

The project area is inhabited by human settlement and economic activities (industrial and commercial features) and no wildlife was noticed at the project site. The distribution of vegetation and wildlife in Kwale County as a region is controlled by climate, the geological formation (soil) and human interaction (tree cutting, clearing and grazing). The total area covered by forests in the region is about 7 per cent, 54,544 hectares. The remnant of the tropical forest in the region has been gazetted for conservation as the Shimba Hills National Reserve and the Mwaluganje Elephant Sanctuary. The project does not traverse any protected area. Plant species are dominated by coconut trees being the main agricultural crop. Other lesser agricultural plants noted includes cassava, cashew nuts, and isolated food crops. Most of the land in the area is covered with grass species, shrubs and in some places ornamental plants and flowers. Tree species seems stunted, perhaps due to the geological formations, soil characteristics and water shortage. Indigenous plant species are fast being replaced by human social and economic activities including commercial and residential settlements.

5.6.1 Flora

Flora of the project area are influenced by the ecosystems namely Mwache forest, Coastal vegetation, Shimba hills as well as Arabuko Sokoke to the north. The ASAL conditions to the west (Tsavo National Park) also influence the western zones of the project area and part of the watersheds. Among the tress and plant species noted around the project influence area are; Tamarind tree, Neem tree, Flame Tree, Acacia ssp, Diospyros ssp, Cynometra-Manilkara type, Riverline plants observed are; reeds, grasses/sedges among others. Mwache Creek also presents species of mangroves. The typical species of creek and mangroves in the Kenya coast include; *Avicennia marina*, *Bruguera gymnorohiza*, *Rhizophora mucronata*, *Ceriops tagal* and *Sonnerata alba*. Following plant species are domesticated and grown in the project influence area along the project site; Maize, Cow peas, Cassava, Sisal, Coconut, Cashew nut. (others in local languages Mwawa, Mwanga,

Mkanju, Mporojo, Kikwata, Mkone, Mnyubu, Mkilifi, Mbuyu (Boabab), Mfune, Mchonge Mahana and Mkwakwa among others). In terms of Agro ecological zone classification the project site corridor lies within Agro Ecological Zones (AEZ) three. The zone comprise of Mangrove Swamps Zone that covers only a small portion of Kinango Sub County area mainly on the sides of the Mwache creek. There are only a few species, which form dense mangrove forest that border Mwache Forest that is composed of Manilkara-Acacia Savannah and Acacia Euphorbia bush land. **Figure 5-8** below shows sample flora near the project area of influence. The pipeline does not pass through the Mwache creek or Mwache Forest.

Figure 5-8: Sample flora near the project area of influence

	
Section of Mwache Forest downstream of project site	Bonje creek mangrove plantation downstream of project site

5.6.2 Fauna

5.6.2.1 Avifauna

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); Brownheaded 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). The transmission line is not located inside Mwache Forest which is a protected/gazetted ecosystem and does not pass through it hence potential impacts on the species not likely because of the lack of interaction of project activities with the ecosystem. The Mwache Forest is approximately 4kms from the starting point of the transmission line. Further, the construction activities are unlikely to present any direct threat to the species.

An inventory of fish species within Mwache River and seasonal streams 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. 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. The fishery

in brackish water environment is dominated by Prawns (Kamba). 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*. Figure 5-9 below shows fish found in Mwache creek. The transmission pipeline does not traverse the Mwache Creek.

Figure 5-9: Sample Fish Species

5.6.2.2 Mammals

Large mammals are not encountered in the project area of influence. The transmission pipeline to the West Mainland and Changamwe are to be laid within the KeNHA road reserve of the Nairobi-Mombasa highway. The road reserve is generally open land, partially paved at shop frontages and on sections with slip roads to adjacent warehouses/ factories.

5.6.2.3 Reptiles

No reptiles were encountered in the project area of influence. The transmission pipelines to the West Mainland and Changamwe are to be laid within the road reserve of the Nairobi-Mombasa highway. The road reserve is generally open land, partially paved at shop frontages and on sections with slip roads to adjacent warehouses/factories.

5.6.2.4 Amphibians

No amphibians were encountered in the project area of influence which is mainly along the highway. The transmission pipelines to the West Mainland and Changamwe are to be laid within the road reserve of the Nairobi-Mombasa highway. The road reserve is generally open land, partially paved at shop frontages and on sections with slip roads to adjacent warehouses/factories.

5.6.2.5 Insects

The insect activity generally observed in the study sites included common house flies, grasshoppers, butterflies, black and red ants, dragon flies, beetles and spiders.

5.7 Kwale County Socio-Economic Baseline

5.7.1 Population and Demography

The county is divided into five sub-counties namely; Kinango, Matuga, Msambweni, Lunga Lunga and Samburu. The sub- counties are further divided into wards 20 wards. The project site lies in Kasemeni ward, Kasemeni location, and Kinango sub-county. According to the population census of 2019, Kwale County has a total population of 866,820 people. This population comprises of 425,121 males and 441,681 females. The population distribution within the five sub-Counties in Kwale is as shown in **Table 5-7** below.

Table 5-7: Kwale County Population Distribution

No.	Sub-County	Population 2019 Census	Area Covered (km^2)
1.	Kinango	94,220	1,612
2.	Lunga Lunga	198,423	2,765
3.	Msambweni	177,690	412
4.	Matuga	194,252	1,034
5.	Samburu	202,235	2,430
Total		866,820	8,254

Samburu sub-county was the most populated in 2019 followed by Lunga Lunga and Matuga. The least populated sub county is Kinango where the project is sited. Population density and distribution in Kwale County is strongly influenced by the topography and the agro-ecological set-up. Significant variations in density occur at the divisional level. The County population density was estimated at 79 persons per Km^2 in 2009. This density is projected to increase to 104 persons/Km^2 in 2018, 111 and 118 persons per Km^2 by 2020 and 2022 respectively. Matuga and Msambweni Constituencies are densely populated because they lie along the Mombasa–Lunga-Lunga highway and well developed infrastructure such as water, road network, and electricity. There are also more industries and tourism hotels along the ocean that serves as source of employment and markets for farm produce. These sub-counties also have favorable climatic condition for farming.

5.7.2 Ethnic Composition

The Digos are the majority in Msambweni, Lunga Lunga and Matuga while the Durumas are the dominant in Kinango. Most Kambas are found in Kinango, Matuga and Lunga Lunga with a significant population in Msambweni.

5.7.3 Settlement Patterns

Kwale County is inhabited mainly by the Digo and Durumas who are the natives, though it has experienced immigrations from other Kenyan and foreign communities. Settlement patterns in the county are both linear and nucleated due to availability of social amenities, infrastructure network (roads, water, electricity) and high agricultural zones dictated by nature of soils and the coastline. In the arid and semi-arid areas, the population is dispersed/scattered due to harsh climatic condition and poor infertile soils.

5.7.4 Land Tenure and Land Use

Along the coastal strip and the coastal uplands, land is mainly owned by absentee landlords, leading to the squatter settlement problem. The trust and government land within these areas have since been adjudicated and government settlement schemes established. In the drier areas of the Nyika Plateau in Kinango, Kasemeni, Samburu, Ndavaya and some parts of Lunga-Lunga Divisions land is held in trust and under group ranches. Land is viewed as communal asset where every member of the community has the right to use it. In most areas adjudication has not been done. Most of the group ranches currently are non-functional and this has resulted in unplanned human settlements in the land. The land is also used for small scale farming, mining and quarrying as well as settlements.

5.7.4.1 Mean Holding Size

Land as a resource is evidently under-utilized in Kwale County. According to 2005/06 Kenya Integrated Household Budget Survey (KIHBS) the main holding size is 4.4 acres for small scale and 100 Acres for large scale. In the drier areas of the Nyika Plateau in Kinango, Kasemeni, Samburu Ndavaya and some parts of Lunga-Lunga Divisions, land is held in trust and under group ranches. There are 13 ranches in the county with an average size of 15,055 Hectares. Out of these five are company ranches and eight group ranches most of which are in Kinango Sub-county.

5.7.4.2 Percentage of Land with Title Deeds

According to the household baseline survey report of 2015 about 45.7% of the households owned land without formal document such as a title or letter of allotment while 27.1% had land under communal ownership. Only 11.4% head of household had formal land ownership documents (title deeds or allotment letters). Disaggregated by gender, 52.6% male-headed households, 20.0% female-headed households and 41.7% youth-headed households owned land without title deeds/allotment letters. Slightly more than half of the adult female headed households used land without formal or non-formal land use rights (squatters) while 7.5% and 6.3% adult male and youth headed households were squatters.

5.7.4.3 Incidence of Landlessness

Kwale County has historically faced a land issue, with the majority of the land held by absentee landlords. As a result, there are high incidences of landlessness, with many families with no access to land having to live as squatters in public or private land. The land situation is further complicated by the lack of land adjudication and the issuance of title deeds, making it precarious and difficult to invest in the development of land. Most households are landless specifically in Matuga and Msambweni sub counties. For the land parcel where the homestead was located, 16.6% were squatters. Such households are clearly vulnerable because of their low incomes and inaccessibility to land. The pipeline traverses a small section of land that is privately owned with the remaining sections of the pipeline running within the road reserve. The road reserve is encroached by traders and a Resettlement Action Plan (RAP) has been prepared which has identified the number of Project Affected Households (PAHs) and their entitlements as per the WB OP. 4.12. The number of PAH**s** is 274 and include 1 private land owner (entitled for compensation for

loss of land and structures) and 273 traders who have encroached on the ROW (entitled for compensation for loss of structures and income).

5.7.5 Education

Education is key to socio-economic and political empowerment. The County has a total of 469 schools with 415 primary schools and 54 secondary schools additionally it has 4 registered youth polytechnics and 1 Kenya medical training college. The project site is close to some of the education facilities and may be affected by the construction especially through noise and dust emissions. In Kwale County, primary school enrollment rate stands at 99%, while for secondary schools enrollment stands at 29%.

Figure 5-10: Sample schools in Kwale County

5.7.6 Health

The County has a total of five (5) government hospitals, ten (10) health centres and ninety (90) dispensaries located in Msambweni, Matuga, Lunga-Lunga and Kinango Sub-Counties. The doctor and nurse population ratio stands at 1:76,741 and 1: 3,133 respectively. In addition, the county has a total of thirty six (36) private health facilities and nine (9) health facilities owned by faith based organizations. The average distance to the nearest health facility within the County is seven (7) kilometres as compared to the required maximum of three (3) kilometres.

The region has a high infection of Schistosoma haematobium, this is evidenced by a prevalence of 43.99% compared to the national prevalence of 23% while prevalence of hookworm disease was 29.63%. This prevalence are higher than the global prevalence of between 10-20% for hookworms according to W.H.O. The prevalence of schistosomiasis was however lower compared to the prevalence of 50-70 % reported in previous years in the coastal region of Kenya. This decrease can be attributed to the control programs implemented in the region since 1984. The emergence of unplanned urban settlements with overcrowding, lack of sanitation and clean water services is likely to cause a threat to residents in terms of transmission of trichuriasis, the prevalence of is approximately 25%. Due to the proximity of the county to Mombasa County as a sea port, cases of drugs and substance abuse and trafficking have been on the increase. HIV/AIDS prevalence at the county was at 8.1% against a national average of 6.35 (KNBS, 2013). AIDS related deaths are common and those mainly affected are within the productive age group of 15-49 years of age, leaving minors and the elderly people to take care of households. It was also noted that the number of HIV/AIDS orphans is on the increase.

Drug abuse is viewed as a major cause of HIV/AIDS. Poverty also increases vulnerability of people with HIV, hence there is need to redirect resources towards support services to poor households. Progressive gains on poverty reduction may be reversed if concerted efforts are not urgently put in place to bring the HIV/AIDS pandemic under control. Implementation of the project thus needs to create comprehensive HIV/AIDS awareness among the workers along the project area. The Government through the Economic Stimulus Programme established health care facilities in the county to complement the existing facilities. However, despite these among other efforts, health care services in the county are still a major challenge due to inadequate health service delivery points and inadequate personnel.

Unemployment in the county is high particularly among youth. Youth population comprises 41 per cent of the population in the county and 61 per cent of the county's labor force. Efforts need to be stepped up to ensure youth become gainfully employed. Current estimates indicate that 38 per cent of the population in the county is poor. The high unemployment and poverty rates underscore a critical need to address the challenge of unemployment by providing opportunities for gainful engagement to all youth. The project county is endowed with numerous natural resources that have determined their economies. These include Kwale Marine National Park and Reserve, nature trail, arable land, and Indian Ocean tourist attractions as beach tourism, game parks, historical and cultural sites and tourist hotels. Thus, the main economic activities include: tourism, farming, fishing, livestock farming, chrome ore, cement, salt, sand, food processing and various manufacturing firms. Opportunities exist in agriculture particularly dairy and crop farming thanks to fertile soils and a good weather pattern.

There are various types of trade in the project area including retail, wholesale, distribution and hawking. The wholesale businesses are few and are located mainly in the major trading Centres. The small-scale retail outlets include canteens, kiosks, hawkers and newspaper vendors. The main goods offered for trade include; (i) General consumer goods such as sugar, maize flour, wheat flour, rice, salt, cooking fat and oil, (ii) body care products such as hair shampoo, body creams and lotions, (iii) cleaning and hygiene products such as detergents and laundry soaps, (iv) medical drugs, (v) hardware products for building and constructions, (vi) electronics in the main shopping centers, (vii) agricultural sector products such as cereals, legumes, tropical fruits such as pineapples, mangoes and coconuts, (viii) sea foods such as fish, (ix) forest products such as timber, charcoal, building poles, herbs, etc. (x) livestock products such as meat, chicken, raw milk and eggs among others. Kwale has served as the main corridor along which many manufacturing firms have established their processing plants and warehouses. There are a number of organizations, SMEs, youth and women groups who are engaged in commercial crafts some as exporters selling on order basis and others as local entrepreneurs selling to tourists.

Some of the organizations and groups, majorly SMEs, engaged in making textiles and garments, household items and upholstery, African jewelry, leather and leather products, wooden carvings, articles from soap stones and basketry, are clients of the Export Promotion Council who have benefited from export leads, trainings and product development.

5.7.7 Employment and Unemployment

Wage employment is still very low within the county, contributing just 8.6% of the average household income. Wage labour is mainly concentrated in the hospitality sector, catering to tourist sites such asthe natural and marine reserves (Shimba Hills National Reserve and Mwaluganje Sanctuary); historic sites (Shimoni Holes, Diani Mosques); forest, coral and sand beaches (Diani, Tiwi, Gazi, Msambweni) and wildlife habitats (bird and turtle breeding grounds). Other formal wage earners include teachers, public servants, general labourers, and those employed in the production and manufacturing sector (mining, agro industry, distilleries). The contribution of self-employment to household income is at 1.9% and 6.2 percent for rural and urban areas respectively. A big number of this group is engaged in the Jua kali sector and other Small and Medium Enterprises (SMEs). The agriculture sector, mainly subsistence farming contributes 80.6% to the household income employing about 62,681 people in the County.

Around 30% of the total labour force aged between (15-64 years) is either unemployed or underemployed. This constitutes 105,774 people. The youths are the most adversely affected. To address youth unemployment, the County government should focus on developing micro, small and medium enterprises from which to canvas for investors. There is also a need to modernize the curriculum, sponsor programs to assess and re-equip youth, so they have the skills the market will be looking for tomorrow. Other interventions and programmes include Uwezo funds, National Youth Service and Women Enterprise Funds.

5.7.8 Income and Livelihoods

Kwale County has a poverty index level of 72-75 percent, compared with the national average of 45 percent. Kwale is therefore one of the very poor counties in the country. Majority of the County population, who are in the rural areas mainly keep livestock as their source of livelihood. Subsistence farming is also practiced. The main crops grown in the area include maize, sorghum, cow peas, cassava and sweet potatoes. The agricultural productivity is very low mainly due to a combination of adverse climate, poor systems for climate change monitoring and ill-adaptation of the farming practices to these factors.

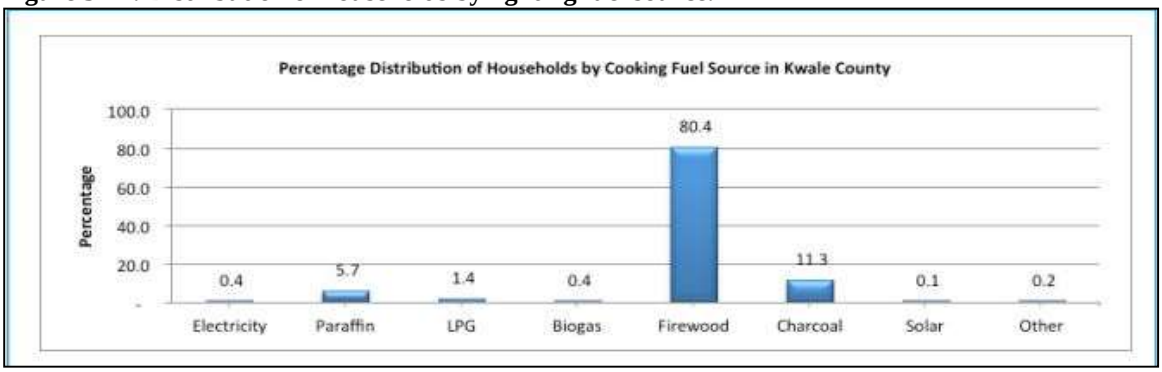
There are five urban areas in Kwale County; Kwale, Kinango, Ukunda, Msambweni and Lunga Lunga. The urban areas are previous sub district headquarters and the main sources of livelihood in these areas are formal employment in the public offices and small-scale retail trading, mainly in groceries. Ukunda town stretches to the Indian Ocean coast and is an important market for both local and international tourism. Kwale town is the headquarters for Kwale County Government and has high potential for rapid growth as a County Headquarters. There are also two main industries which provide important economic activities in the County, Base Titanium Company which is a titanium mining company and Kwale International Sugar Company.

5.7.9 Energy

Lack of access to clean sources of energy is a major impediment to development through health related complications such as increased respiratory infections and air pollution. The type of cooking fuel or lighting fuel used by households is related to the socio-economic status of households. High level energy sources are cleaner but cost more and are used by

households with higher levels of income compared with other sources of fuel like firewood which are mainly used by households with a lower socio- economic profile. 20.1% of residents in Kwale County use electricity as their main source of lighting. A further 17.6% use lanterns, and 41.8% use tin lamps. Electricity use is slightly common in male headed households at 12% as compared with female headed households at 8%. More than half (71.7%) of households rely on firewood for cooking while 12.2% use charcoal, 7.7% use kerosene and 6.6% use liquefied petroleum gas (LPG). The county has potential for solar, wind (Samburu and Kinango) and biogas (along the coastal strip) which has not been exploited.

Figure 5-11: Distribution of households by lighting fuel source.



Source: KNBS 2019

5.7.10 Water and Sanitation

The main water resources in Kwale comprise of rivers, shallow wells, springs, water pans, dams, rock catchments and boreholes. However, most of the rivers are seasonal thus cannot be relied upon to supply the much-needed water for both agriculture and household uses. The main sources of water are boreholes, springs, dams, water pans and rock catchments. The average distance to the nearest water point in Ukunda is two (2) Kilometres. This is below the internationally required less than one (1) meters distance to the nearest water source.

Table 5-8: Sources to the water supply of Kwale County

Source	Production capacity (m^3/d)	Supply to Kwale (m^3/d) 2006-2011	2013	Q1 and Q2 2015
Mzima	35,000	17,849	13,364	12,951
Marere Springs	12,000	2,965	2,202	2,134
Tiwi Boreholes	13,000	1,880	1,649	1,598
Total	143,000	47,900	45,811	44,396

Source: -WaSSIP Report

Kwale County heavily depends on water sources from outside the County for its potable needs. Its main sources of water supply are the Mzima Springs located about 200km west; Baricho Water works located about 150km north and Marere springs and Tiwi boreholes found about 40km south of Kwale. Generally, the whole Kwale County has a daily water demand of 185,000m^3 of water against the available 45,000m^3. There is therefore a water

shortfall of 140,000m^3, about 76% of the demand, which is met by tapping the groundwater sources KWAWASCO, 2015). A significant proportion of the population relies on groundwater for their potable water needs. The shortage of water in the area and lack of funds to undertake capital investment projects has delayed extensions of water borne sewerage, forcing the residents to rely on on-site systems for sewage management. About 17% of the households in Kwale, as well as hotels and most public buildings, have septic tank and soakage pit systems. Of the 13,000 septic tanks that are in use in Kwale, most of them are found in high-income residential areas. A great majority of households in Kwale, (about 70%) use pits latrines (Munga et al., 2006).

5.7.11 Water Demand

Kwale County has a high-water supply deficit in the coast region. During the first six months of 2015 the supply was equal to 29% of the net demand, down from 33% in 2013. The combination of an annual population growth of 3-4% and a decreasing supply increases the gap between supply and demand each year. The current net demand in 2015 is estimated at 185,000 m^3/d and is expected to increase to 300,000 m^3/d in 2035. The total gross demand, including a 54% NRW in 2015 of which, based on estimates and results from pilot DMAs and O&M project in NML, 60% physical losses), is 209,000 m^3/d in 2015. Based on a NRW target of 20%, of which 60% physical losses, the demand in 2035 is 340,000 m^3/d. This is lower than used in the design, which uses the conservative assumption that the 20% NRW in the Design Manual refers only to physical losses.

In terms of water allocation to communities along the proposed transmission line and to avoid potential conflicts with these communities with respect to access, CWWDA will liaise with the respective WSP in the different counties on how to best provide for any identified customers enroute while avoiding pressure reduction/losses in the transmission line eg. provision of water off-takes at appropriate locations.

5.7.11.1 Sanitation

Kwale County was ranked number 23 out of 47 in the county sanitation benchmarking by the MOH with open defecation (OD) at 51.2 % (WSP 2014). Latrine coverage is a key component as far as household sanitation in disease prevention and human dignity. The main type of toilet facility in the county is the pit latrine. The latrine coverage in the County is at 55%, which is below the national target of 90%, with improved toilets accounting for 19.5%, unimproved toilets at 14.3% with open defecation reduced to 31.6 % (Agris 2017). The county is committed to deliver its rural villages and communities to open defecation free (ODF) and raise household sanitation coverage to above 85% to address the burden of diarrhoeal and related illness.

5.7.12 Solid Waste

Accumulated waste deposits are an indication of societal lifestyles, waste management practices and production technology. Improper management of waste leads to proliferation of disease; environmental degradation and ultimate impact on livelihoods. The County has inefficient waste management system where a great deal of wastes generated is dumped in illegal dumpsites leading to physical accumulation of garbage waste leaching its effluents into fresh water systems. Poor transportation of waste has led to littering, making waste

an eyesore, particularly plastics in the environment. Through commitment to sustainable development, the County aims to balance the broader economic and social challenges of development and environmental protection. This is reinforced in the constitution under the fundamental right to a clean and health environment. In an effort to address this situation, the County government should fast track on the spatial plan and land use mapping and policy formulation processes to designate areas of waste disposal and undertake basic actions to manage the sites including fencing, manning and weighing of the waste.

5.7.13 Trade and Industry

Kwale County has 4 manufacturing industries; these include Coast Calcium Limited,Base Titanium, Bixa Limited and Kwale International Sugar Company. These industries are engaged in mining and agricultural activities. Other industries include 2 bakeries and two companies distilling water. The county is rich in coconuts, cashew nuts, sisal, mangoes, bird eye chillies and commercial crafts. Processed sisal and bird eye chillies are currently being exported while raw cashew nut and mature coconuts are bought by processors for value addition before export. Mangoes are being processed into pulp by a company which is currently selling locally as it prepares for export.

5.7.14 Gender

Culture, literacy levels and religion dictates gender issues which are reinforced by society values, norms and roles to males and female. These disparities including marginalization of women in education, income and property rights and lack of credit in turn will dictate the levels of participation in decision making and roles played as well as contribution of resources during and after construction of the road. In terms of productivity, women play the primary role in farming while most men engage in fishing. Females are mainly involved in cooking while males undertake grazing, fishing, woodwork driving and, tourism related activities.

5.7.15 Tourism and Recreation

Tourism is a key sector and its transformation is critical for creation of employment, revenue generation, and creation of demand for goods and services and inclusive growth. Tourism development in the County is hinged on our beaches, marine parks and reserves, wildlife and culture of the community. The County has invested a lot in developing Kwale as a tourist destination notably in infrastructure (opening up beach access roads, pedestal walkways, street lights), marketing and promotion (participation in expos and exhibitions-National and International) and capacity building (beach operators). In conjunction with the National Government the Ukunda Airstrip is been expanded, Samburu–Diani road has been tarmacked and Dongo Kundu has been opened all of which will boost tourism in the County. A number of factors have negatively impacted tourism in the County among them insecurity and negative publicity. The County Government of Kwale is in the process of rehabilitating more beach access roads, constructing public amenities (washrooms) along the Beach access road, improving waste management systems and safety on the beaches, partnering with key stakeholders to develop and diversify tourism products with a key focus on eco-tourism, sports adventure and home stays and “marketing Kwale as a tourist destination” initiative.

5.7.16 General Infrastructure

Infrastructure and public utilities in the project counties, basic services such as healthcare and banking, as well as major trading markets are concentrated along the road networks. This has resulted in unequal distribution of basic amenities and services within the County and hampered easy access to these services by the far- flung rural communities. Kwale County has several public utilities and infrastructure available although not in all areas. These includes: electric power lines, transport, drainage structures sewerage disposal, water supply and transport infrastructure (road, railway line, sea transport and airport). The availability of the public utilities and infrastructure do not adequately cover all the areas. There are several modes of transport within the county, these includes both the motorized and the non- motorized means of transport. Motorized transport includes; tuk tuk, motorbikes, heavy trucks, matatus while the non-motorized transport; hand carts and bicycles.

5.7.17 Communications and Service Lines

Kwale County has a total of 1,483.1Kms of classified roads of which 187.7Kms are Bitumen surface (paved surface), 425.2Kms is gravel surface and 871.2Km of earth surface roads/rural access roads. An international trunk road traverses the county from Mombasa to Lunga Lunga on the Kenya-Tanzania border. On the northern side the Mombasa–Nairobi Highway virtually forms the boundary of Kwale and Kilifi County. There are 4 Km of railway line and four (4) airstrips at Ukunda/Diani, Shimba Hills National Reserve, Lunga Lunga and Kinango although only one is operational. Air transport has contributed to the growth of tourism sector, which significantly contributes to the economic growth of the county. There is a small port at Shimoni and Vanga which is mostly used for water transport by boats controlled by Kenya Wildlife Service. Water transport potential in the county remains largely unexploited.

Telephone and postal services are available at Kwale, Lunga Lunga, Kinango, Ukunda, Shimba Hills, Vanga, Kikoneni, Shimoni, Lukore, Diani and Matuga. Other areas are Mackinnon Road and Samburu. The region is served with manual and automatic exchange facilities. With emergence of mobile phones and courier services, utilization of Telkom Kenya services and those of the Postal Corporation of Kenya has since declined which has led to neglect of these facilities and vandalism of equipment. vvThere are three major mobile telephone providers in the county with network coverage of about 75 per cent. Most of the major towns such as Ukunda, Lunga Lunga and Kinango are well covered. Equally, most of the highway from Likoni to Lunga Lunga and Mombasa-Nairobi Highway are also well covered. Most of the hinterland is either completely uncovered or experience difficulty in accessing the network.

The most affected areas include Kubo Division, Vanga, Samburu, Davanya and parts of Lunga Lunga. The three network providers have about five (5) base transmission stations (BTS) each in the county. Radio, television and the print media are powerful tools for information dissemination, entertainment and education. The county is well covered by KBC among other FM stations. Over 75 per cent of households in the region own radios making it the most prevalent medium of communication. Television coverage is mainly

concentrated in urban centres. KTN, KBC, Citizen, KISS, NTV TV, K24 and other channels cover the area.

5.8 Mombasa County –Bio-physical Environment

5.8.1 Location and Size

The County is located in the South Eastern part of the Coastal region of Kenya. It covers an area of 229.9 Km^2 excluding 65 Km^2 of water mass which is 200 nautical miles inside the Indian Ocean. It borders Kilifi County to the North, Kwale County to the South West and the Indian Ocean to the East. The County lies between latitudes 3^0 56' and 4^0 10' South of the Equator and between longitudes 39^0 34'and 39^0 46'east of Greenwich Meridian. The County also enjoys proximity to an expansive water mass as it borders the Exclusive Economic Zone of the Indian Ocean to the East.

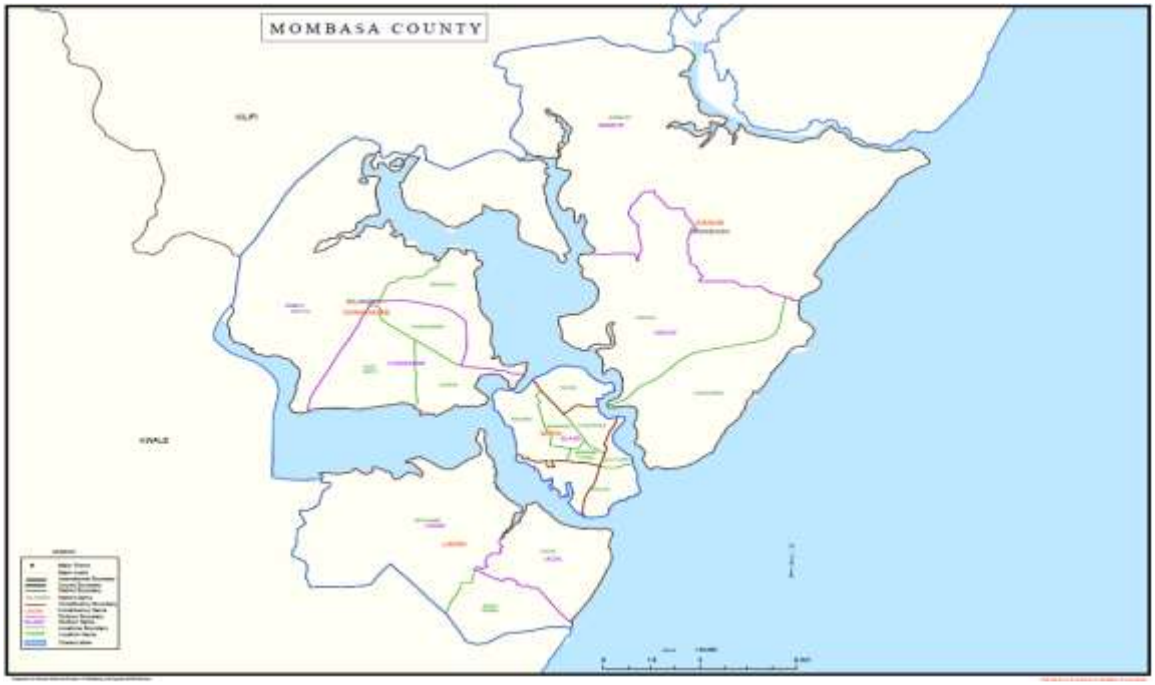


Figure 5-12: Map of Mombasa County.

There are four distinctive areas covered by Mombasa County that are geographically separated by the creeks that surround the Island. These areas are the Island, West Mainland, North Mainland, and South Mainland. Mombasa County lies within the coast lowland, which rises gradually from the sea level in the east to slightly over 76 m above sea level in the West Mainland. The highest point is at Nguu Tatu hills in the North Mainland that rises up to 100 m above sea level.

5.8.2 Administrative Units

Administratively, the County is divided into six sub-counties namely: Mvita, Nyali, Changamwe, Jomvu, Kisauni, and Likoni and thirty county assembly wards as shown in **Table 5-9** below. Pipeline traverses Changamwe and Jomvu Sub Counties.

Table 5-9: Mombasa County's Electoral Wards by Constituency

Sub-County	Wards
Likoni	Mtongwe Shika-Adabu Bofu, Likoni Timbwani
Kisauni	Mjambere, Junda, Bamburi, Mwakirunge, Mtopanga, Magogoni, Shanzu,
Changamwe	Port Reitz Kipevu Airport Changamwe Chaani
Mvita	Tudor,Ganjoni/Shimanzi, Tononoka, Mji wa Kale/Makadara
Jomvu	Jomvu Kuu, Miritini, Mikindani
Nyali	Frere Town, Ziwa la Ngombe,Mkomani, Kongowea, Kadzandani

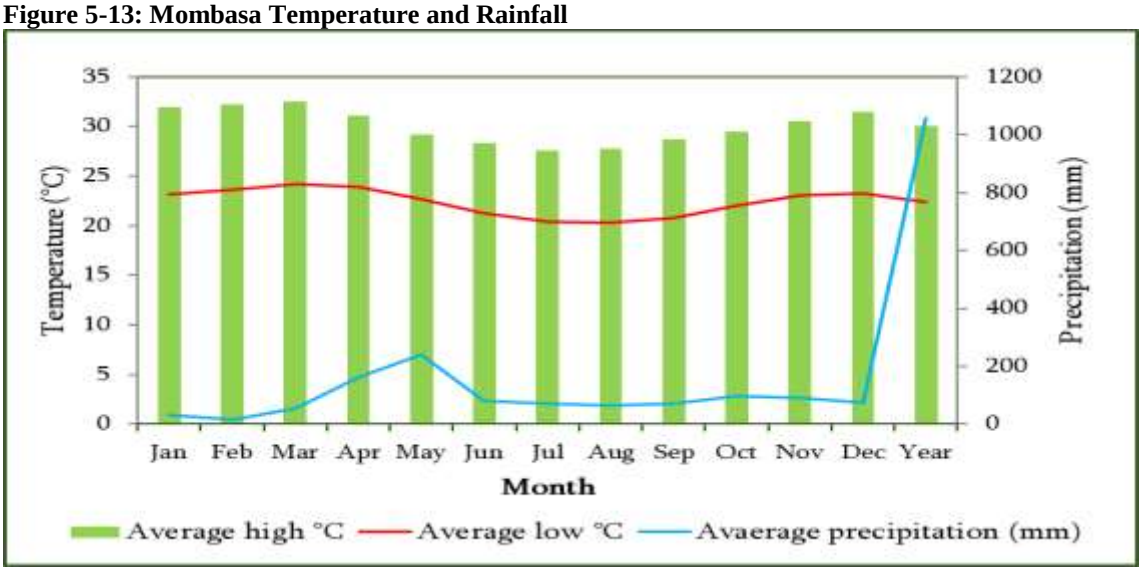
Table 5-10: Sub-counties affected by the transmission line in Mombasa County

Sub-County	Wards
Changamwe	Port Reitz Kipevu Airport Changamwe Chaani
Jomvu	Jomvu Kuu, Miritini,Mikindani

5.8.3 Climatic Conditions

The climate in Mombasa County and that of the proposed project site is generally associated with the regional climatic patterns attributed to the semiannual movement of the inter-tropical convergence zone (ITCZ) as well as the two monsoons experienced in the area, namely, the northeastern monsoon in January to March and the southeastern monsoon in June- October. The dominant rainy season occurs in the March-June period while the short rains are in November to December. The average annual rainfall is approximately 1000 mm (see figure 5-13 below)[1].

Figure 5-13: Mombasa Temperature and Rainfall



The average annual temperature in the area is usually above 28°C. The months of January and February are the driest with a maximum average temperature of 33°C. The coldest month is usually July with a minimum of 23°C. The area is generally hot and humid all the year round with an average humidity at noon of about 65% due to a high evaporation

[1] World weather information service -Mombasa

rate. The month of February has the lowest number of sunshine hours (high precipitation) while may has the highest (lowest precipitation) as shown in Figure 5-14.

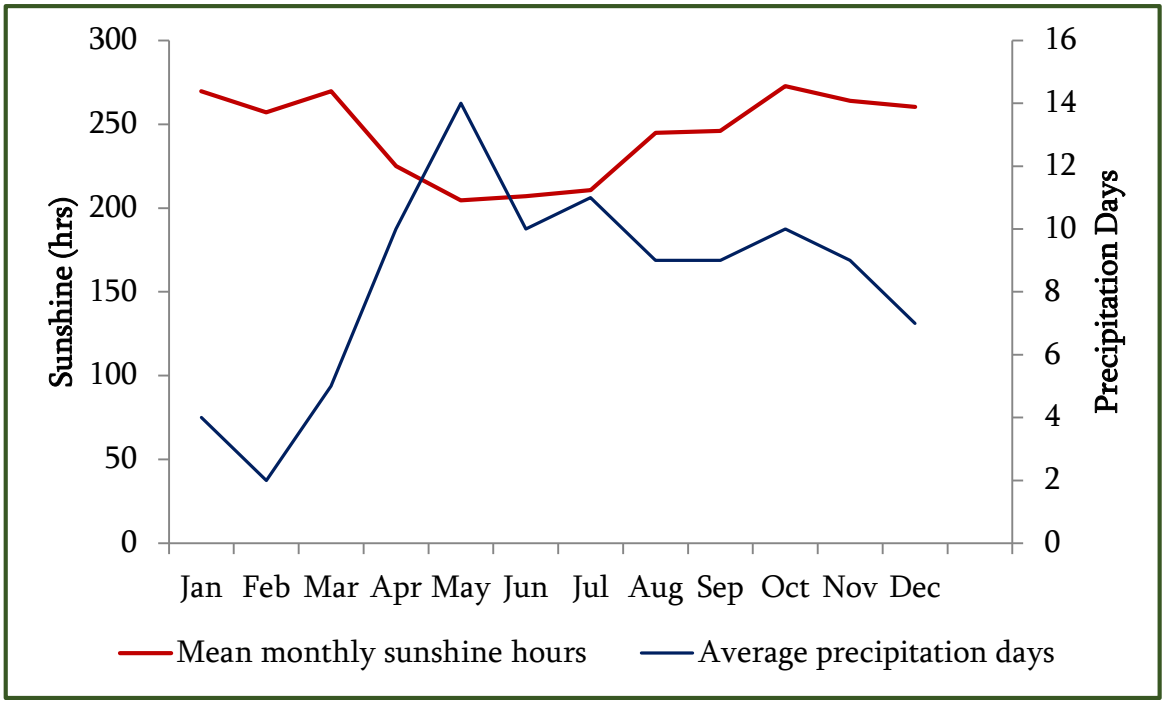


Figure 5-14: Sunshine hours and precipitation days

5.8.4 Baseline Ambient Environmental Measurements

5.8.4.1 Ambient Air Quality Measurements

Table 5-11: Ambient Air Emission:– PM10

Location	GPS Coordinates	Proxy	Time	PM10 (µg/m3)	WHO AQG	EMCA (AQR,2014)
Papyrus Junior Academy	574518.94 E 9562699.23S	MP1	9.30am	36	50µg/m^3	50µg/m^3
Masjid Kwaadam Mosque	574819.85E 9560729.09S	MP2	11.20am	41		
Mitsajeni Primary School	572768.27E 9564441.40S	MP3	15.15pm	28		
Prevailing Weather Conditions						
Sunlight			Sunny			
Precipitation			None			
Wind			Still			
Temperature			28 Degrees Celsius			
Cloud Cover			Sparse			
Date			23rd October 2022			
Duration of Measurements			1hour			

Source: Field Data

Table 5-12: Ambient Air Emission:– Sulphur Dioxide, SO2

Location	GPS	Proxy	SO_2	WHO AQG	EMCA

	Coordinates		(µg/m3)		(AQR,2014)
Papyrus Junior Academy	574518.94 E 9562699.23S	MP1	9.30am	<5	80 µg/m^3 *24hours
Masjid Kwaadam	574819.85E 9560729.09 m S	MP2	9.30am	<5	
Mikindani		MP3	<8.1		
Prevailing Weather Conditions					
Sunlight			Sunny		
Precipitation			None		
Wind			Still		
Temperature			28 Degrees Celsius		
Cloud Cover			Sparse		
Date			23rd October 2022		
Duration of Measurements			1hour		

Source: Field Data

Table 5-13: Ambient Air Emission:– Nitrogen Dioxide

Location	GPS Coordinates	Proxy	Time	NO2 (µg/m3)	WHO AQG (µg/m^3)	EMCA (AQR,2014)
Papyrus Junior Academy	574518.94 E 9562699.23S	MP1	08.00-09.00am	16	40 µg/m^3 *24hours	80 µg/m^3 *24hours
Masjid Kwaadam Mosque	574819.85E 9560729.09S	MP2	08.00-09.00am	27		
Mitsajeni Primary School	572768.27E 9564441.40S	MP3	12:00 -13.00pm	29		
Prevailing Weather Conditions						
Sunlight			Sunny			
Precipitation			None			
Wind			Still			
Temperature			28 Degrees Celsius			
Date			23rd October 2022			
Duration of Measurements			1hour			

Source: Field Data

There are 3 sensitive receptors along the project routes (but within a buffer of 200ms) that may be adversely affected by the air emissions from the project. They include; religious institutions, educational and administrative institution. Figure 5-15 below shows the sensitive receptors (educational facilities and religious institutions) along the proposed project routes and within a buffer zone of 200ms.

Figure 5-15: Sensitive Receptors

5.8.4.2 Ambient Noise Emission Measurements

Table 5-14 below shows the ambient noise levels in the project routing based on emission measurements undertaken as part of the ESIA study. Ambient noise levels are high (above the limits) due to proximity of the receptors to the highway which is a source of noise.

Table 5-14: Ambient Noise Levels

Location	GPS Coordinates	Proxy	Time	LAEq	LAMax	LAMin
Papyrus Junior Academy	574518.94 E 9562699.23S	MP1	11.00	62.4	70.7	40.3
Masjid Kwaadam	574819.85E 9560729.09S	MP2	09.00	58.1	77.1	36.8
Mitsajeni Primary School	572768.27E 9564441.40S	MP3	08.00	55.1	71.2	34.6
Prevailing Weather Conditions						
Sunlight			Sunny			
Precipitation			None			
Wind			Still			
Temperature			28 Degrees Celsius			
Date			23rd October 2022			
Duration of Measurements			1hour			

Source: Field Data

5.8.5 Groundwater and Surface Water

The shales are not generally favorable for groundwater storage. The yield from Jurassic shales is usually small, possibly because of the poorly sorted in equi-granular nature of the grits and the filling of the inter-granular spaces with secondary calcite. The overlying shales are of low permeability but inter-bedded limestone makes suitable aquifers. Some of the Shales and Corals were deposited during periods of desiccation when minerals salts, mainly carbonates, chlorides and sulphates were precipitated. The salts are disseminated throughout the succession with varying degrees of concentration and mainly being partly soluble, they are readily re-dissolved by ground water. Hence the water derived from those beds is often saline. Due to this reason, the deep borehole water in this formation is likely to be highly mineralized. Most of the aquifers in the study areas are replenished by the streams and seasonal Lake (Ziwa Tseha) plus percolation of the rainwaters. Presence of fossil water is confirmed from saline water drilled in the sedimentary rocks. Sea level fluctuations in Pleistocene times and their possible hydrogeological implications for Kenya have been the subject of considerable speculation and some investigation since the turn of the century. The transmission pipeline crosses a small stream adjacent to the road side dumpsite at Miritini at Ch. 3+880.

5.8.6 Land Ownership

Land ownership in most areas is not guaranteed as most of the residents do not legally own land and the land they live on is owned by absentee landlords. A number of informal settlements exist in the county. The growing population continues to exert pressure on

existing units of housing, creating a huge demand for quality and affordable housing. The current land tenure has also made it difficult for physical planning of the county to be undertaken. This situation has no implication on the project which has been designed to be located in the ROW and RAP will be undertaken to determine displacement impacts.

5.8.6.1 Land Use

Human settlement in the coast is characterized by rapid urbanization and mushrooming of unplanned settlements due to high population growth rate and shortage of quality and affordable housing. The informal settlements lack proper access roads, drainage systems, water and provision of social amenities such as schools. In the past, industrial development took place only in the island. The town planning scheme of 1926 set aside specific areas which were zoned for industry and warehousing, as well as the port and other urban functions. In the 1950's large amounts of land was purchased at Changamwe with the intention of making it available for industries; thus the oil refineries at Changamwe

The main crops under cultivation in the county include cassava, cucurbits family, maize, vegetables, millet, and sorghum. These are most preferred due to their resistance to diseases and pests. The total acreage under food crop stands at 400 ha while the total acreage under cash crop is 500 ha. Livestock keeping and fishing is also practiced in the County.

High-density residential clusters exist on West Mainland, namely Changamwe-Magongo and Mikindani. The remaining are relatively of lower density and fairly informal, which include Jomvu, Miritini, and Port reitz. There are also pockets of staff housing for organizations such as Kenya Revenue Authority (Customs) and Kenya Oil Refinery. About thirteen (13) informal settlements exist at various locations including Chaani, Changamwe, and Mikindani localities. The Mombasa Oil Refinery at Changamwe and Moi International Airport at Port Reitz are two main establishments influencing growth and developmental trends. There are also numerous container yards for freight services in this zone.

5.8.7 Biological Environment

The project area is inhabited by human settlement and economic activities (industrial and commercial features) and no wildlife was noticed apart from smaller species of birds, rodents and reptiles (mainly snakes) but the whole range of organisms could not be established under this assessment. Arabuko Sokoke forest (situated about 50km to the north) and the lower fridges of Tsavo National Park have a nature influence on the animal species in Mombasa and its surroundings, though this situation has been changed by social and economic interests. Plant species are dominated by coconut trees being the main agricultural crop. Other lesser agricultural plants noted includes cassava, cashew nuts, and isolated food crops towards inland Zones (Miritini, Mazeras, Mariakani and the surrounding transition areas). Most of the land in the area is covered with grass species, shrubs and in some places ornamental plants and flowers. Tree species seems stunted, perhaps due to the geological formations, soil characteristics, and water shortage. Indigenous plant species are fast being replaced by human social and economic activities including commercial and settlements.

5.8.7.1 Flora

Most of the vegetation in Mombasa County has been cleared over time to pave way for residential and industrial developments. However, five vegetation zones can be distinguished on certain parts of the County.

1. *Afzelia-Albizia/Panicum* (Lowland Moist Savanna)-The areas suited for this type of vegetation includes Mombasa Island, Changamwe, and Likoni.
2. *Manilkara-Dalbergia/Hyparrhenia*: (Lowland Cultivation Savanna)-A small area around Mtongwe
3. *Brachystegia-Afzelia*: (Lowland Woodland)-The Lowland Woodland type of vegetation would do well in the north coast in Kisauni and on a small part to the south of Mtongwe
4. *Combretum Schumanii-Cassipourea*: (Lowland Dry Forest On Coral Rag)-This vegetation zone is to be found all along the coastline from Cannon Point through Shelly Beach to Diani Beach in Kwale County.
5. Mangrove Thickets - This is the only natural vegetation zone in Mombasa County that has not been cleared out completely and that is mainly because mangroves grow in tidal swamps unsuitable for human settlements.

Potentially Mombasa County has an outstanding diversity of natural vegetation, but being an urban area natural vegetation has very little chance of survival except on selected areas such as parks. Mangroves are threatened because mangrove poles are in big demand for building. The mangrove forests and sea grass beds perform vital functions in protection and enrichment of the coast eco-system. They serve as habitat for many species of fish octopi and holothurians that are exploited commercially. Mangrove forests are habitat for a variety of terrestrial and aquatic plants and animals.

Among the tress and plant species noted around the project influence area are (Tamarind tree, Neem tree, Flame Tree, Acacia ssp, Diospyros ssp, Cynometra–Manilkara type, Cashew nut. Others in local languages Mwawa, Mwanga, Mkanju, Mporojo, Kikwata, Mkone, Mnyubu, Mkilifi, Mbuyu (Boabab), Mfune, Mchonge Mahana and Mkwakwa among others. Mangroves species namely; Aricennia marina,Bruguera.,gymnorohiza, Rhizophora mucronata,Ceriops tagal, Sonnerata alba,Rhizophora mucronata and Ceriops taga. These are reportedly the predominant species across the Kenyan Coastal zone and highly used for construction and other purposes. Around 50 % of the 159 rare plants in the project area are found in Shimba Hills and Arabuko Sokoke Forests (the two, however, are about 50km away from the project corridor). The pipeline route in this County is within the Nairobi-Mombasa Highway and situated in the reserve where vegetation cover is not present or very scanty.

5.8.7.2 Fauna

Human habitation and agricultural activities have also significantly interfered with both terrestrial and aquatic habitats in the Project areas. There is no terrestrial wildlife observed in the project areas since most land is already developed. However, limited rodents like squirrels, moles and different bird and insect species among others are found in the area. There are no fauna including avifauna species that are categorised as Critically Endangered

(CR) or Endangered (EN) in the section of the pipeline traversing Mombasa County. This section of the pipeline is in an urban area with primarily extensively modified habitats.

Among the aquatic species present include frogs, fresh water fishes are found naturally in the rivers. Livestock keeping is significant with cattle livestock, goats, sheep, bees, poultry, rabbit and pigs. The terrestrial fauna includes many species of birds, reptiles, mammals and insects. The aquatic fauna include prawns, crabs and molluscs.

5.8.7.2.1 Mammals

Large mammals are not encountered in the project area which is mainly in an urban setting.

5.8.7.2.2 Reptiles

The only reptile that was encountered in all study sites was *Ichnotropis squamulosa* (Common Rough-Scaled Lizard).

5.8.7.2.3 Amphibians

Xenopus laevis pertersii and *Phrynobatrachus natalensis* may be present in water bodies within the project area.

5.8.7.2.4 Insects

The insect activity generally observed in the study sites included common house flies, grasshoppers, butterflies, black and red ants, dragon flies, beetles and spiders.

5.9 Mombasa County Socio-Economic Baseline

5.9.1 Population and Demography

The County is divided into six sub-counties namely; Mvita, Nyali, Changamwe, Jomvu, Kisauni, and Likoni, thirty county assembly wards, twenty locations and thirty five sub-locations. According to the 2019 Kenya National Bureau of Statistics (KNBS) Housing and Population Census, the total population for the county stood at 1, 208,333 people of which 610,257 were males and 598,046 were females. The ratio of men to women stands at almost one to one with need for efforts towards gender parity in provision of socioeconomic opportunities. The possible explanation for lower male population across the age cohorts across the age of 19 years are factors related to lower life expectancy amongst males. The **table 5-15** below shows the population density by gender in each sub-county.

Table 5-15: Population and density by gender and sub-county

Sub County	Male	Female	Total
Changamwe	68,761	63,121	131,882
Jomvu	83,002	80,410	163,415
Kisauni	146,748	145,176	291,930
Likoni	126,962	123,392	250,358
Mvita	75,565	78,601	154,171
Nyali	109,219	107,346	216,577

Source: KNBS population and census data 2019.

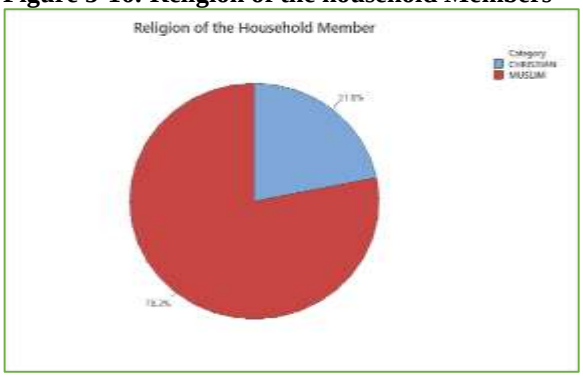
5.9.2 Ethnicity

The local communities include the Mijikenda, Swahili and Kenyan Arabs. The Mijikenda is the largest community in Mombasa county making almost 35% of the total population in the county.

5.9.3 Religion

The majority of Mombasa's population is Muslim. This large population has recently adapted Arab immigrant practices into Swahili. The celebrations of maulidi, a celebration of the Prophet Muhammad's birth, and shirk, the Mombasa adopted name for the Swahili New Year, have witnessed an increasing overlap of cultures within the city. This parallels increased migration of Muslim Arab immigrants in the region. The Catholics are pastorally served by the Metropolitan Roman Catholic Archdiocese of Mombasa. Majority of the household members 78.2% in the project are are Muslims and only 21.8% are Christians.

Figure 5-16: Religion of the household Members

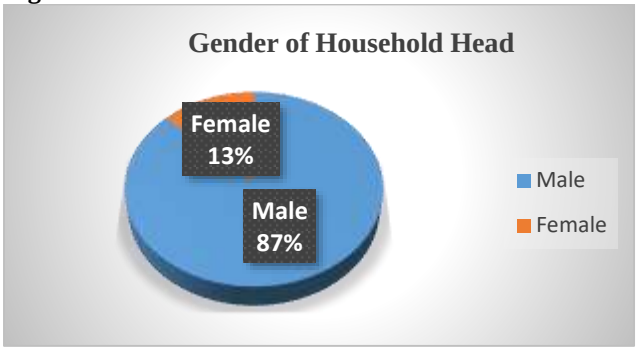


Source: Survey Data

5.9.4 Gender

Gender inequality in the county is manifested in all spheres of life and poses a serious development challenge. The enrolment rate in schools indicates that 49%, 51% and 48 % of those enrolled in pre-primary, primary and secondary schools respectively are girls. The dropout rate for girls is lower than for boys but their performance is poorer. Statistics from the Kenya National Chamber of Commerce and Industry shows that 70% of its business members are men, whereas women and the youth account for 30%. Majority of the women depend on petty trade and low-income jobs. Low representation of women in decision making organs (civic and development committees) is also a major gender issue. Gender disparities are also found in government institutions where more than 80% of all the departmental heads and their deputies are men. The same trend is evident in all major private sector institutions such as tourist hotels. Majority of the households heads (87.0%) in the project area are Male and only 13.0% are female.

Figure 5-17: Gender of the Household Head



Source: Survey Data

5.9.5 Settlement Patterns

Population distribution and settlement patterns in the County are influenced by proximity to vital social and physical infrastructure networks such as roads, housing, water and electricity. Other factors that influence settlement patterns include accessibility to employment opportunities, availability of cheap housing, security and land tenure systems. Highly populated areas are in Majengo, Bamburi, Bangladesh, Mikindani, Jomvu, Miritini, Migadini, Port Reitz, Mishomoroni and Bombolulu. The County has various settlement schemes namely Mwakirunge, Jomvu-Kuu, Bububu-A, Shika-adabu, Vyemani, Mwembelegeza and Majaoni. Large number of landless people most of whom live in the city's slums of Mishomoroni, Junda and Kisumu Ndogo in Kisauni (North Mainland), Shika-Adabu and Ngomeni in Likoni (South Mainland) and Bangladesh in Changamwe.

5.9.6 Land and Land Uses

5.9.6.1 Mean Holding Size

A sizeable number of people living in the peri-urban areas of the county practice subsistence small scale farming and keep different types of livestock. Land ownership for agricultural and livestock activities remains a thorny issue in the County as most of the residents do not legally own land and the ones they cultivate on are owned by absentee landlords.

5.9.6.2 Percentage of Land with Title Deeds

Land ownership is a very important factor in the socio-economic development of the County. However, by July 2013, only 30 % of the residents had title deeds to their land. It is important to note that more title deeds were issued in some parts of the county in the month of August 2018. In addition, only 1% of the county population is supported by agriculture which translates to 6,797 individuals.

5.9.6.3 Incidence of Landlessness

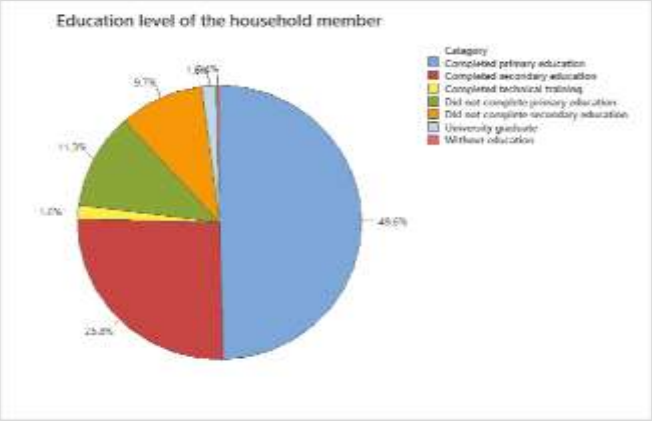
The county experiences very high incidences of landlessness thus leading to a large number of squatters. However, efforts have been made to correct the imbalance and boost economic activities on the land by issuance of title deeds in 2018.

5.9.7 Education

Mombasa County Government recognises that education and training is one of the levers that will make the county into becoming avibrant modern commercial hub with a high standard of living for its residents. Literacy levels in the county are relatively low at 86.3 per cent. Net Enrollment Ratioin ECD, school and secondary school is 57.4%, 81.1% and 32.5% respectively. The challenge for the county is to be able to provide adequate school infrastructure such as desks, chairs, classrooms, laboratories and staffing.

About 49.6% of the PAPs household heads had attained primary level of education and 25.8% achieving secondary levels of education. In the survey conducted 1.6% PAPs household heads had completed technical training, while 9.7% and 11.3% respectively did not complete secondary and primary level education. A further 1.6% of the PAPs household heads had no formal education.

Figure 5-18: Education Level of the Household Head



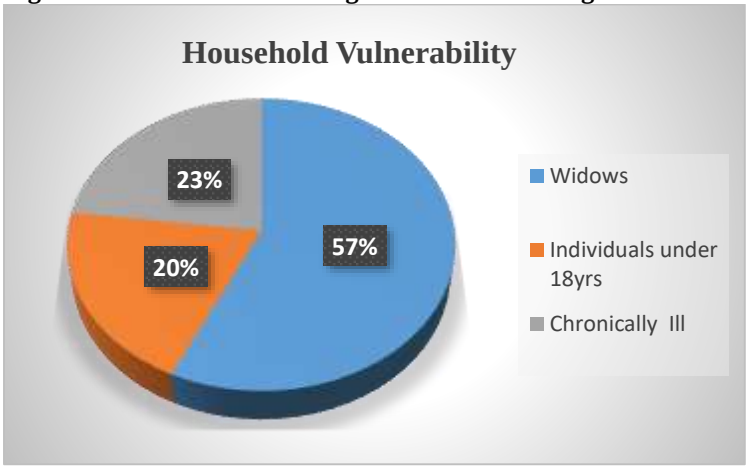
Source: Survey Data

5.9.8 Health

Due to the location of the county as a sea port, cases of drugs and substance abuse and trafficking have been on the increase. HIV/AIDS prevalence at the county was at 8.1% against a national average of 6.35 (CIDP, 2018). AIDS related deaths are common and those mainly affected are within the productive age group of 15-49 years of age, leaving minors and the elderly people to take care of households. It was also noted that the number of HIV/AIDS orphans is on the increase. Drug abuse is viewed as a major cause of HIV/AIDS. Poverty also increases vulnerability of people with HIV, hence there is need to redirect resources towards support services to poor households. Progressive gains on poverty reduction may be reversed if concerted efforts are not urgently put in place to bring the HIV/AIDS pandemic under control. Implementation of the project thus needs to create comprehensive HIV/AIDS awareness among the workers along the project area. Vulnerability identified during the survey within the PAPs as shown below was composed of: -

1. Women headed households/widows (25.0%)
2. The sick/chronic illnesses (16.7%)
3. Household Headed by children under 18 years (58.3%)

Figure 5-19: Household Falling in Vulnerable Categories



Source: Survey Data

5.9.9 Poverty, Income and Employment

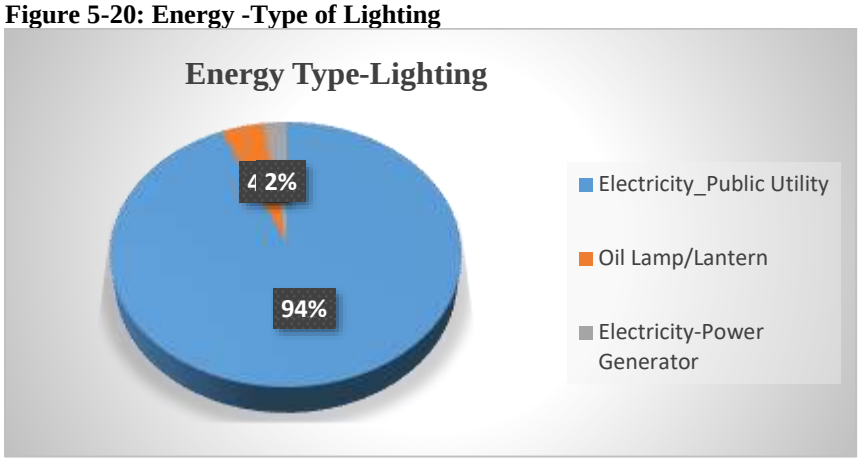
5.9.9.1 Employment and Unemployment

Unemployment in the county is high particularly among youth. Youth population comprises 41 per cent of the population in the county and 61 per cent of the county's labor force. Efforts need to be stepped up to ensure youth become gainfully employed. Current estimates indicate that 38 per cent of the population in the county is poor. The high unemployment and poverty rates underscore a critical need to address the challenge of unemployment by providing opportunities for gainful engagement to all youth. In 2013 the county economy needed to generate between 59,983 and 49,077 to bring unemployment level to NUR of 6% or 4% respectively. In order to keep unemployment at NUR the county economy needs to meet projected employment in 2017 of at least 780,694 jobs.

5.9.10 Energy

The Kipevu power plant produces power which is fed into the national grid. There are plans to construct an 800MW LNG power plant in Dongo Kundu area. Only 9% of residents in Mombasa County use liquefied petroleum gas (LPG), and 39% use paraffin. 6% use firewood and 41% use charcoal. The most common cooking fuel among male headed households is paraffin and charcoal at 40% each while the most common cooking fuels for female headed households is charcoal 45%. Likoni Division has the highest level of charcoal use in Mombasa County at 46%. Changamwe Division has the highest level of use of paraffin in Mombasa County at 49%. A total of 93.2% of residents in Mombasa County use electricity as their main source of lighting. A further 4.5% use lanterns, and 2.3% use tin lamps. Figure 5-20 below shows distribution of households by lighting fuel source.

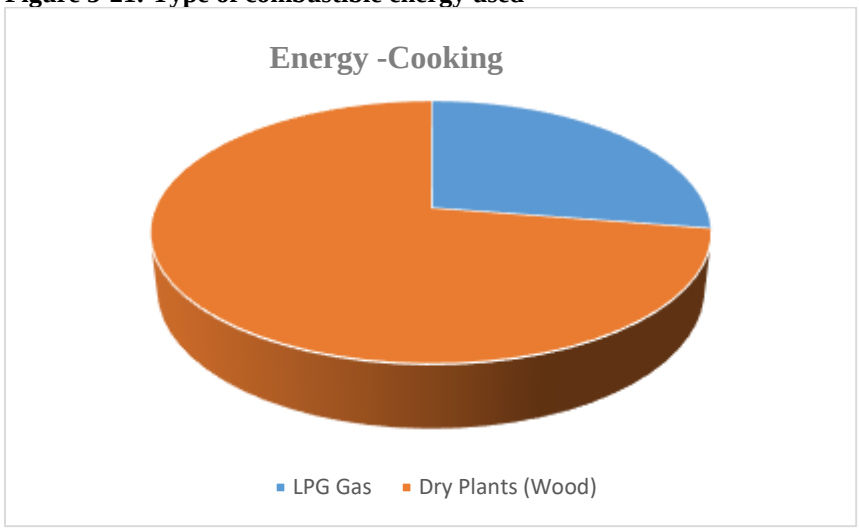
Figure 5-20: Energy -Type of Lighting



Source: Survey Data

Majority of the PAHs 72.5% use LPG gas as their main source of cooking and only 27.5% use dry plants.

Figure 5-21: Type of combustible energy used



Source: Survey Data

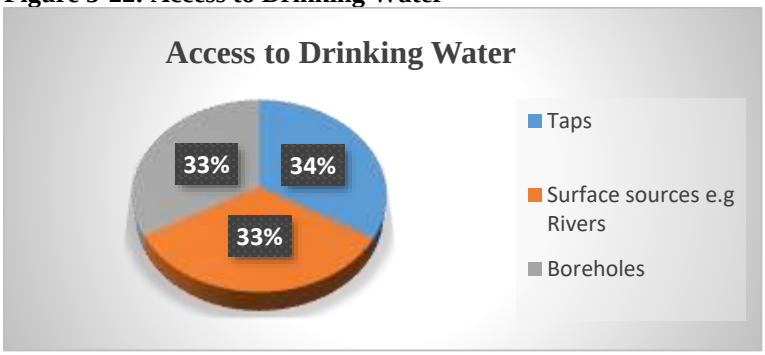
5.9.11 Water and Sanitation

Mombasa is supplied from several sources;

1. Baricho Wellfield; Present Design Capacity 110,000m^3/d. Average supply to Mombasa is approximately 45,000m^3/d
2. Mzima Springs; The present supply from the Mzima Springs is 35,000m^3/d, out of which less than 70% reaches the Mazeras Reservoirs.
3. Marere Springs; Installed capacity is 12,000m^3/day. At present, the system currently produces 8,000m^3/d, out of which approx. 4,000m^3/day is supplied to Mombasa.
4. Tiwi Wellfield; The average production capacity of the Tiwi Wellfield is 10,000m3/day, with approx. 2,000m^3/day reaching the Likoni service area.

According to the results of the socioeconomic survey, the majority of PAHs (33.6%) get their drinking water from the tap. Those who had access to surface water were at 33.2%, the same as those who had access to water sources or boreholes outside the house as shown in figure 5-22 below.

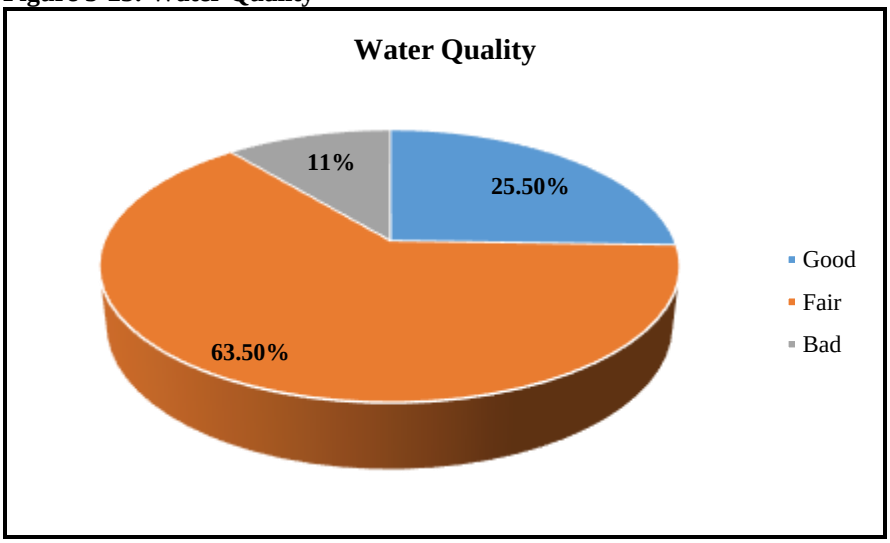
Figure 5-22: Access to Drinking Water



Source: Survey Data

The water quality is generally fair with 63.5% of the PAHs indicating that the water quality is acceptable. 25.5% of the PAHs find the water to be good while 11% find it to be bad.

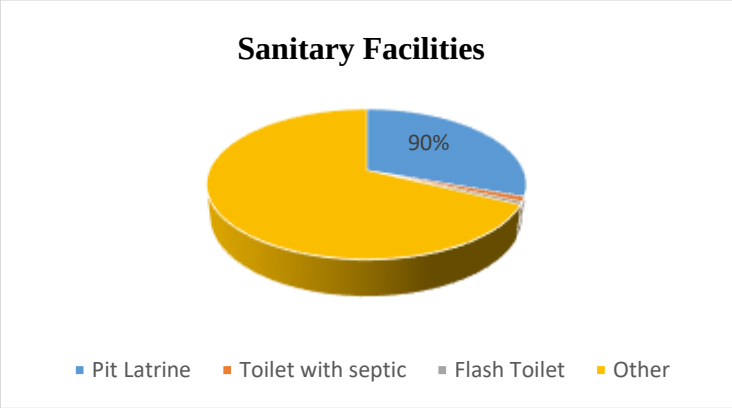
Figure 5-23: Water Quality



5.9.11.1 Sanitation

The most common type of toilet in use is a pit latrine. 100% of surveyed respondents said they used pit latrines without septic tanks.

Figure 5-24:Sanitary Facilities



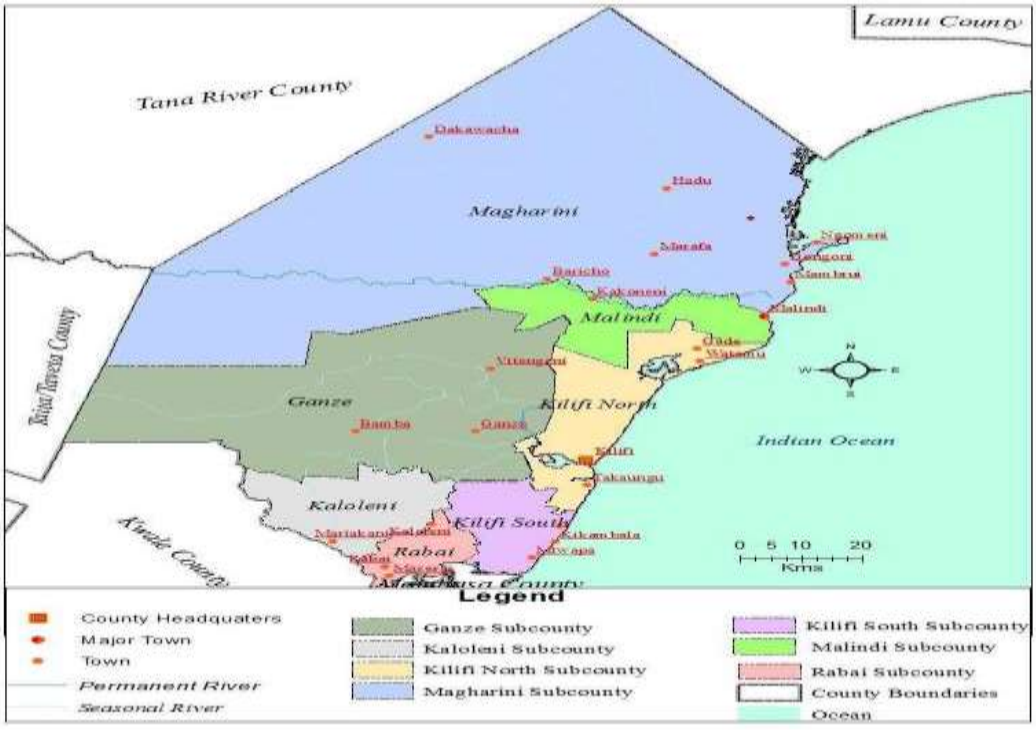
Source: Survey Data

5.10 Kilifi County Bio-physical Baseline

5.10.1 Location and Size

Kilifi is one of the six counties in the Coastal region of Kenya and lies between latitude 2º20" and 4º0" South, and between longitude 39º 05" and 40º 14" East and covers a total surface area of 12,610km^2. It borders the Counties of Tana River to the North, Taita Taveta to the West, Mombasa and Kwale to the South, Lamu County to the North East and the Indian Ocean to the East. Kilifi County has seven sub counties, namely; Kilifi North, Kilifi South, Ganze, Malindi, Magarini, Rabai and Kaloleni. It has 17 divisions, 54 locations, 175 sub-locations. Magarini Sub-county is the largest while Rabai is the smallest (Figure 5-25 below). The pipeline traverses Rabai Sub county.

Figure 5-25:Kilifi County and Neighbouring Locations



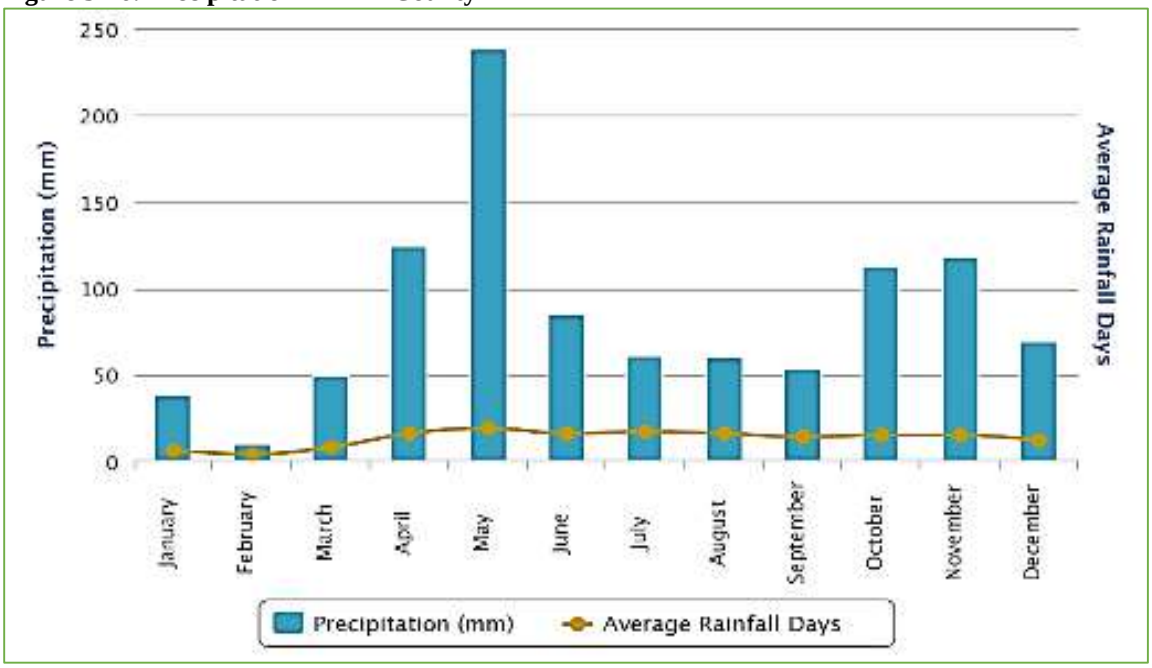
5.10.2 Physical and Topographic Features

Kilifi County has four major topographic features. The first one is the narrow belt, which forms the coastal plain and varies in width from 3km to 20km. The coastal plain lies below 30m above sea level with a few prominent peaks on the western boundary such as the Mwembetungu hills. Across this plain are several creeks with excellent marine swamps that are richly endowed with mangrove forests and present great potential for marine culture. This zone is composed of marine sediments, including coral, limestone, marble, clay stones and alluvial deposits that support agriculture. The second topographical feature is the foot plateau that lies to the east of the coastal plain. It is characterized by a slightly undulating terrain that falls between 60m and 150m altitude and slopes towards the sea. A number of dry river courses transverse the surface with underlying Jurassic sediments consisting of shells, sandstones and clays. This zone is covered by grassland and stunted shrubs. The third feature is the coastal range, which falls beyond the foot plateau between 150m to 450m altitude and has distinct low-range sandstone hills. These hills include Simba, Kiwava, Daka, Wacha, Gaabo, Jibana, Mazeras and Mwangea. The fourth is the Nyika Plateau, which rises from 100m to 340m above sea level covering about two-thirds of the county area on its western side. This plateau is characterized by a low population density, thin vegetative cover, shallow depressions and gently undulating terrain. It constitutes the arid and semi-arid areas of the county, which are suitable for ranching. The drainage pattern of the county is formed by one permanent river, a number of ephemeral rivers and streams which drain into Indian Ocean. The permanent river is the Sabaki River while the seasonal rivers are Nzovuni, Rare, Goshi and Kombeni. The streams include Wimbi, Kanagoni, Masa, Muhomkulu and Mleji. In Kilifi County, the pipeline route is situated in the second topographical zone.

5.10.3 Climatic Conditions

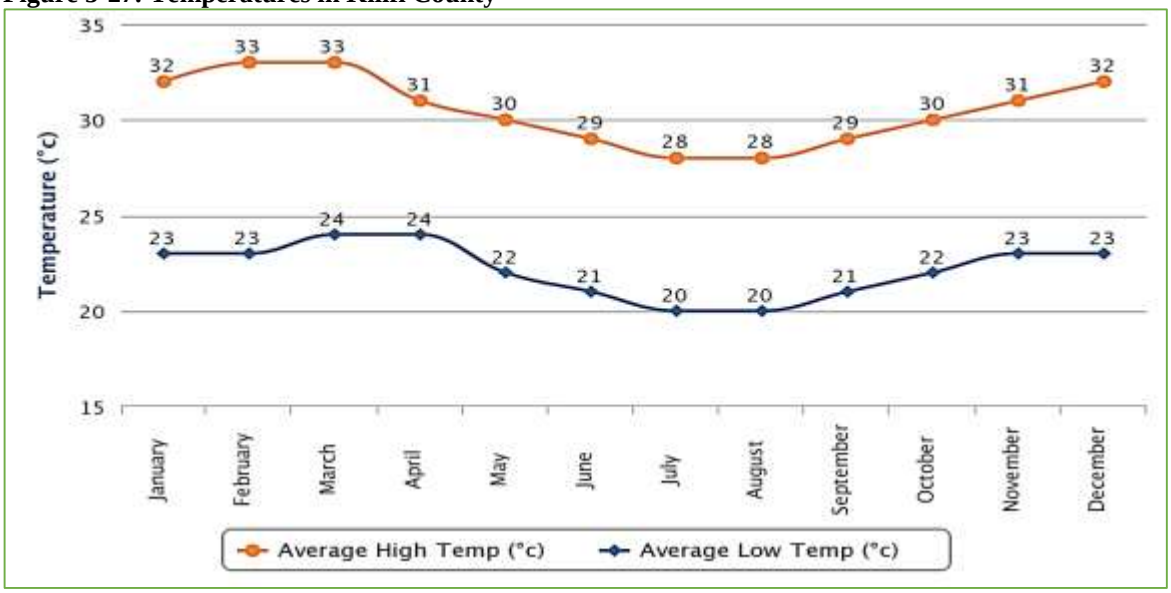
The county has a bimodal rainfall pattern with average annual precipitation ranging from 300mm in the hinterland to 1,300mm in the coastal belt. The coastal belt receives an average annual rainfall of about 900mm to 1,300mm while the hinterland receives average annual rainfall of about 300mm to 900mm. The short rain season is experienced in the months of October, November and December while the long rains are experienced in the months of March–April and May. The most important season to the hinterland is the short rains for pasture regeneration and water recharge while the long rain season is the most important season for the coastal area for crop production. Areas receiving highest average annual mean evaporation ranges from 1800mm along the coastal strip to 2200mm in the Nyika plateau in the hinterland. The highest evaporation rates are experienced during the months of January to March in the county. The annual temperatures range between 21°C and 30°C in the coastal belt and between 30°C and 34°C in the hinterland. The county experiences a very important wind field with relatively moderate wind speeds ranging from 4.8Km/h along the coastal strip to 12km/h in the hinterlands.

Figure 5-26: Precipitation In Kiifi County



Source: Kenya Metrological Departmment

Figure 5-27: Temperatures in Kilifi County



Source: Kenya Metrological Departmment

5.10.4 Ecological Conditions

The county is divided into five Argo-Ecological Zones (AEZ) defining areas with similar production related characteristics such as annual mean temperatures, vegetation and humidity. These zones include the following: Coconut-Cassava Zone: This zone covers the coastal uplands and the low-level coastal plains and has the county's highest potential for crop production. The major farming activities in this area includes fruit tree cropping (mango, citrus, cashew nut and coconut), vegetable farming (chili, brinjals, okra) and food

cropping (maize, bananas, cowpeas, upland rice, green grams). Dairy farming also does well in this zone. The zone receives an average annual precipitation of 1,300mm per annum and a mean annual temperature of 24°C.

Cashewnut-Coconut zone: this zone stretches northwards along the coastal plain up to the Arabuko Sokoke forest. The zone receives an average precipitation of 900mm and mean annual temperature of 24 ^{0}C. It has agricultural potential with the same crop types as the coconut-cassava zone but with slightly less production. The pipeline route falls in this zone. Livestock-Millet Zone: The zone is of lower agricultural potential with annual precipitation ranging from 700mm to 900mm. The area is suitable for dry land farming supporting drought tolerant crops and ranching activities. Lowland Ranching: This zone varies in altitude from 90m to 300m with annual mean temperature of 27^0 Celsius and annual precipitation of 350mm to 700mm. The major activities within this zone are ranching and wildlife.

Coconut Cashew Nut – Cassava Zone: this zone is mainly found in Kilifi South and North constituencies and is the smallest of all the zones. It lies at an altitude between 30m to 310m above mean sea level with mean temperature of 27^{0}C and annual precipitation of 900mm per annum. The area has a similar potential for the crops found in the coconut-cassava and cashew nut-cassava.

5.10.5 Geology and Soils

The geology of the Kenyan coast is dominated by rifting and breakup of the Paleozoic Gondwana continent and the development of the Indian Ocean. The Proterozoic gneisses of the Mozambique belt form the basement of an intracratonic basin, filled with continental permo-Triassic classics. The sea-level changes, isostatic readjustments and the tectonic movements contribute to the geomorphology of the Kenyan coast. The region is divided into three main physiographic belts namely the flat coastal plain. Next, are the broken severely dissected and eroded belts that consist of the Jurassic Shale overlain in places by a residual sandy plateau. Finally, there is the undulating plateau of sandstone that is divided from the Jurassic belt by a scarp fault.

Areas around the sea have Pleistocene coral reef mainly used as a source of limestone for the cement industry and source of building stone. The seashore of the Kenyan coast has extensive sand beaches which makes a town an attractive tourist destination area. The mineral sands occur in various parts of the Kenyan coast in almost similar geologic environments. Geochemically, mineral sand deposits contain ilmenite, rutile, zirconium as well as other minerals and trace elements that could be of radioactive nature, such as thorium.

Soils in the region gradually change to 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. There are five main categories namely;

- Soils developed on higher-level lagoon deposit, sands, which are light with very low fertility, they are excessively drained and very deep.
- Soils in the mangrove swamps, they are poorly drained soils, very deep and excessively saline, the soil texture is medium to heavy.
- Soils developed in shales, they are well-drained to imperfectly drained, they are shallow to moderately deep.
- Soils developed on raised coral reef limestone with a mixture of lagoon deposit; these are light soils, medium to heavy texture and of low fertility
- Soils developed on the lower-level lagoonal deposits are variable and of low fertility. They are complex of very deep soils of varied drainage, colour texture and salinity.

The soils in the project areas are primarily sedimentary of origin. It consists of consolidated sand, silts, clays and limestone. Sites near the ocean sit on soil and rocks of coral origin.

5.10.6Hydrology and Drainage

The Indian Ocean is the largest water mass in the area and influences the general surface drainage pattern with all land sloping towards the ocean hence all the surface run-off is expected to drain to the sea through the natural drainage systems. However, due to the dense human settlements and activities of the natural drainage systems have been interfered with resulting in occasional flooding. The drainage of the coastal zone generally adjusts to the original slope towards the east that is typical of the general tilt of the Eastern African margin that has been altered by human activities.. Floods in Kilifi town have been in the past been observed in Charo wa Mae market and in the areas surrounding Oloitiptip Market. The pipeline traverses sections that are not prone to flooding. According to the detailed design, none of the sites selected are expected to experience said flooding.

Due to the rugged topographic nature upstream and the relatively high soil porosity, drainage in the higher elevations is efficient with no possibility of flooding during rains. However, due to dense settlements, natural drainage systems and channels have been destroyed or blocked by human settlements, roadside economic activities and waste materials. Surface drains are highly contaminated from sources including fuel surface stations (mostly discharging oil residuals into open drains), industrial effluents and domestic sewage (open sewers or direct discharge from unserved areas) as well as storm water transporting pollutants into the drains.

5.10.7 Biological Environment

5.10.7.1Flora and Fauna

Arabuko Sokoke Forest Reserve, Malindi Marine Park and Watamu Marine Reserve are conservation sites for the flora and fauna. Arabuko Sokoke Forest Reserve is a rich reservoir of biodiversity, housing birds such as Clarke's Weaver, Sokoke Scops Owl, Amani Sunbird and Sokoke Pipit, mammals such as Elephant-shrew, Sokoke Bushy-tailed mongoose, Ader's Duiker and Elephants. The marine parks have coral reefs, sea grass beds, mangroves and mudflats which house a high fish diversity, marine mammals (e.g.

dolphins), turtles and various species of shorebirds. Wildlife in the county is mainly found in the Arabuko Sokoke Forest Reserve, Malindi Marine Park and Watamu Marini Reserve. In Arabuko Sokoke Forest Reserve, there are 240 bird species, 79 amphibian species, 52 mammal species and 600 plants species. The Clarke's Weaver is completely endemic to the forest, while the Sokoke Scops Owl, Sokoke Pipit, and east coast akalat, Amani Sunbird and Spotted Ground Thrush are only found in the park and a few in Tanzania. These mammals are also endangered species: Aders Duiker, Sokoke Bush Tailed Mongoose, and Golden rumped elephant shrew. The transmission line route is not traversing or near any of the reserves.

5.11 Kilifi County Socio-Economic Baseline

5.11.1 Administrative and Political Units

There are seven sub-counties, 35 divisions, 62 locations and 165 sub-locations. All these lies within an area of 12178km^2. Magarini sub-county is the largest with an area of 5229km^2 while Rabai is the smallest sub county covering an area of 208km^2. There are 35 county government administrative and electoral wards and 1,912 villages in the county. This information is summarized in **table 5-16** below.

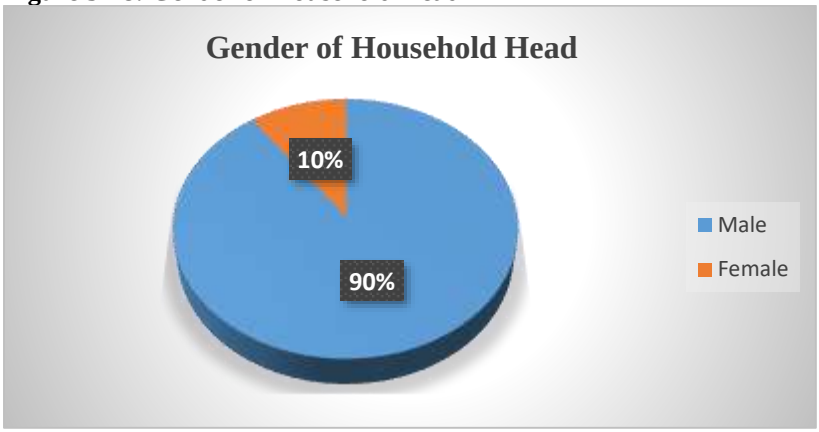
Table 5-16: Kilifi County Population Distribution and Size

No.	Sub-County	Population 2019 Census	Area Covered (km^2)
1.	Chonyi	62,335	193.00
2.	Ganze	143,906	3,218
3.	Kaloleni	193,682	706.00
4.	Kauma	22,638	181.00
5.	Kilifi North	178,824	264.00
6	Kilifi South	206,753	290.00
7	Magarini	191,610	5,229.00
8	Malindi	333,226	2,263.00
9	Rabai	120,813	208.00
Total		**1,453,787**	**12,553.00**

5.11.2 Population and Demography

The county is predominantly inhabited by the Mijikenda community. Nevertheless, county residents constitute a representation of Kenya's forty four (44) tribes and a small population of foreigners. The population of the county is estimated to be 1,498,647 in 2019 as projected from the Kenya Population and Housing Census of 2009, composed of 723,204 male and 775,443 female. The population is projected to rise to 1,591,901 (out of which 45% are male and 55% female) and 1,841,958 out of which 47.8% males and 52.2% females in 2020 and 2025, respectively, at a mean inter-censual annual growth rate of 3.05 percent. The males represent 46.5 percent while the females represent 53.6 percent of the total population indicating a male: female ratio of 1:1.15. The county's dependency ratio stands at 101.45 per cent. Majority (90.0%) of the household heads in the project area were males, while the females form 10.0% of the householdheads.

Figure 5-28: Gender of Household Head



Source: Survey Data

5.11.3 Ethnic Composition

Kilifi is a cosmopolitan town with mixed ethnic groups. The predominant inhabitants (about 80%) are from the Mijikenda groups (mainly Giriama and Chonyi). Other groups include the Swahili-Arab descendants, Barawas, Bajunis, Somalis as well as other groups from inland.

5.11.4 Settlement Patterns

The settlement pattern is mainly linear in dimension and scattered all over the county because of the infrastructural network and the location of the agricultural potential zones.

5.11.5 Land Tenure and Land Use

According to a Kilifi County Baseline Survey (2013) 65% of farm land was owned by household head or spouse, about 20% communally owned and 4% rented out by individual owners. 34% of households had title deeds to their land, 55% owned land without formal documents, 22% had communal rights to use of land and about 8% had use of land but never been allocated (squatter). This indicates that about 66% of all households did not have formal titles to the land and therefore could not use land as collateral to borrow loans or as incentive to undertake investments. Percentage of households with title deeds has, however, greatly improved since then, courtesy of the Government of Kenya's title issuance and settlement schemes acceleration program and County Government support of administration of new adjudication schemes. Between 2013 and 2017, 105,470 Ha of land in 35 adjudication sections were surveyed and demarcated, benefiting over 40, 000 households (Department of Land, Housing, Energy, Physical Planning, 2017).

Natural pastures occupy almost half of County farm lands, woodlots 7%, improved pasture/forage production 8%, homesteads 9%, subsistence crop production 21%, commercial crop production 1.5% and unusable land (swampy, rocky, hilly, etc.) 8%.

Use of land that has not been allocated to current occupiers (squatters) in the County is not so much a landlessness problem as is a communal protest against historical land injustices associated with colonialism and delayed or skewed post-colonial state's implementation of

land sector reforms. Kilifi, as are most coastal Counties, is still contending not only with the monumental ten-mile coastal strip land alienation problem but also the British Crown land legacy. These legally protected lands are at the core of the squatter problem in both the rural and urban areas of the County. While the Kenya Government, through the National Land Commission has in recent times been regularizing squatter settlement on the former British Crown land (that became state land after independence and now public land), formalizing squatter settlements in the privately registered land in the ten-mile coastal strip remains a thorny issue.

Delay in redressing the crown land legacy, which alienated vast areas of prime land for allocation to British subjects at the pleasure of their king/queen, has led to the squatter problem and what is now popularly known as 'land grabbing', the irregular alienation of public land to private 'developers'. The result of all this is growth of unplanned urban settlements, alienation of public utility spaces, dispossession and displacement of poor and vulnerable communities, increasing social inequalities and many other socio-economic problems. The County Government will, therefore, continue working with the national land commission and the land administration system in general towards formalization of all settlements, particularly of areas considered ancestral land by the occupiers. The pipeline in this County is within the reserve and in not located in any section of land with legacy land issues.

5.11.6 Mean Holding Size

The County's farm land use pattern indicates availability of a relatively high average acreage per farming household and favourable physical conditions for the production of a variety of food and cash crops. This is deduced from the fact that almost half of County farm land is natural pastures, with only 21% under subsistence crop production and a mere 1.5% under commercial crop production. The mean land holding size per household is 3.04 Ha while the mean holding size for large scale farmers is 8.09 Ha in the county.

5.11.7 Education

This section captures information on preschool education, primary, secondary, vocational training centers, technical education, adult and continuing education and tertiary and university education.

5.11.7.1 Early Childhood Development Education

According to the CIDP 2018-2022, the county has 799 public ECDE Centres with a total of 1723 teachers, 123 male and 1600 female. There are also 810 private Early Childhood Development Education Centers (ECDE) with a total of 1,513 teachers, 76 male and 1437 female. Gross enrolment at pre-school level stands at 135,571 pupils. Those in the public are 45445 boys and 44265 girls while those in the private are 22968 boys and 22813 girls. Transition Rate from pre-school to the next level is 45%, implying that an estimated 55% of the pupils don't proceed to primary education[2] The teacher pupil ratio for those employed by the county is 1:130. Teacher pupil ratio considering those employed by parents is at 1:50. There is need to take deliberate efforts to improve the infrastructure

[2] Institute of Economic Affairs 2016

development, hire qualified staff, integrate and strengthen nutritional and school health programs, enhance engagement with local communities. These are vital for enhancing child care and development whilst securing effective and efficient delivery of quality education at the ECD level.

5.11.7.2 Primary Education

According to the CIDP 2018-2022, the county has a total of 756 primary schools comprising of 543 public and 213 private. Enrolment at public primary school is 255,552 pupils i.e. 126,771 boys and 128,781 girls while enrolment at the private schools stand at 32010, thus 15922 boys and 16142 girls. The teacher pupil ratio in primary school is 1.85 which is more than twice the recommended ratio of 1:40. There is a total of 5,662 teachers in the public schools, 3111 male and 2551 female. In order to improve the quality of education, there is need to expand the infrastructure, recruit qualified and competent staff, strengthen integration of nutrition and health programs and continue to improve stakeholder engagement for delivery of quality education in primary schools in the county.

5.11.7.3 Secondary Education

According to the CIDP 2018-2022, the County has a total of 249 secondary schools, comprising of 196 public and 53 private. Enrolment in public secondary schools stands at 53,149 thus 29,322 boys and 23,268 girls, whereas the private has 4032 boys and 3750 girls making a total of 7787 students. This translates into a Gross Enrolment of 60,936 students in secondary schools at the county level. Secondary school teachers in the county are 851 male and 483 female thus a total of 1334. Teacher pupil ratio is at 1:83 which is more than twice the recommended ratio of 1:40. There is need to invest in the expansion of existing infrastructure by proper utilization of equalization funds, develop and institutionalize county scholarship to increase access to education especially for poor students, improve teaching workforce and strengthening the participation of parents to fully support the attainment of secondary education outcomes in the county.

5.11.7.4 Tertiary and University Education

According to the CIDP 2018-2022, Pwani University is the only public university in the county with an enrolment of approximately 8,000. There are also campuses of four universities including MT Kenya University and Nairobi University, located in Malindi town, offering different market driven courses. Additionally county has nine private accredited colleges; one middle level college (KMTC Kilifi) and 28 youth polytechnics. These institutions offer youth a chance to further their skills to make them competitive in the labor market.

5.11.7.5 Adult and Continuing Education

The total enrolment in adult and continuing education stands at 7,736 students. The total number of instructors stands at 119 across the County (CIDP 2018-2022).

5.11.7.6 Vocational Training Centres

There are 28 public vocational training centers with a total enrolment of 1969 male and 1292 female making a total of 3,261 students. There are only 38 instructors thus 28 male and 13 female employed by the county, making the trainer/trainee ratio to be at 1:86. Those

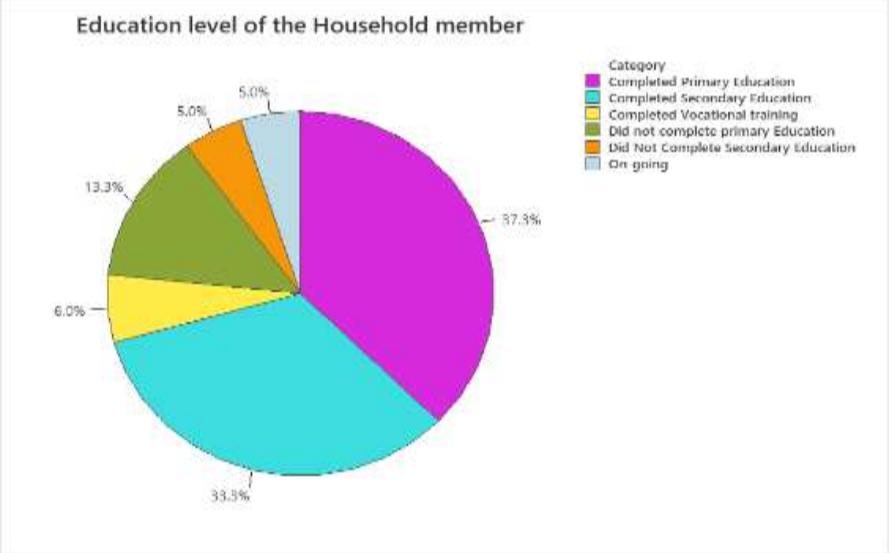
joining VTCs from the primary schools are at 5% and have a completion rate at 65%.There is need to enhance equitable access of youths and young adults to TVET Institutions in a bid to acquire skills for employment and entrepreneurship development (CIDP-2018-2022).

5.11.7.7 Technical Training Institutions

There are 2 technical training institutions in the county namely: - Godoma technical training institute in Ganze Sub County and Weru technical training institute in Malindi Sub County. The total enrolment of the two institutions is 203 students, i.e. 118 male and 85 females. Teachers for the 2 institutions stand at 4 male and 3 female making a total of 7 (CIDP 2018-2022).

About 37.3% of the PAPs had attained primary level of education and 33.3% achieving secondary levels of education. These percentages are inclusive of household heads and other members of the household. In the survey conducted 6.0% of the PAPs had completed technical training, while 13.3% and 5.0% respectively did not complete Secondary and Primary level education. A further 5.0% of the PAPs are ongoing with their education.

Figure 5-29: Household Literacy Level



Source: Survey Data

5.11.8 Health

This section describes health access, existing health facilities by type, community health units coverage, morbidity, nutritional status, immunization coverage, maternal health care, access to family planning services, HIV and AIDS prevalence rates and related services.

5.11.8.1Health Access

Access to health services is described by the state of existing health facilities, health personnel and their distribution within the county. Kilifi County has a total of 1,426 health workers for all cadres. These include 15 Medical Specialists, 84 General practitioners (MOs), 561 Nurses, 110 Clinical officers, 90 public health officers among others. The department is largely understaffed. It has 5,129 medical and 828 non-medical staff, which

translates into a total staffing gap of 5,957. The doctor patient ratio is 1: 10,000 people while the Nurse patient ratio is 4 per 10,000 people. The average geographical distance to nearest the health facility (rural & urban) is 5km. The total hospital bed capacity is 492 distributed as follows: 184 beds for Kilifi County Hospital, 158 beds for Malindi Sub County hospital, 82 beds for Mariakani Sub County Hospital, 16 beds for Bamba Sub County Hospital and 22 beds for Jibana Sub County Hospital.

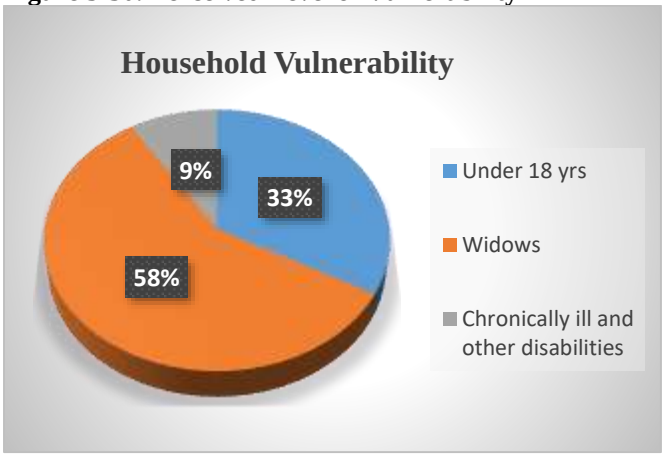
5.11.8.2 HIV and AIDS Prevalence Rates and Related Services

The HIV epidemic continues to disproportionally impact the socio-economic spectrum of the entire county. The county has HIV prevalence of 4.5%. However, sub counties such as Malindi, Kilifi North and Kilifi south have an average of over 10% in HIV prevalence. The county thus is grappling with the rapid increase in the new infections amongst adolescents and young people. This exemplified by the fact that over 50% of new HIV infections occur amongst adolescents and young people aged between 15-24 years. Multiple factors including the tourism industry, drug and substance abuse, peer influence, risky sexual behaviors and inadequate employment opportunities drive HIV/AIDS new infections among young men and women in the county. By December 2019, 31,630 people were living with HIV and over 19% were adolescents and young people aged 15-24 years. Significant to note is the fact that the reduction in AIDS related deaths and the increase in new infections amongst adolescents and young people has significantly increased the total number of persons living with HIV (PLHIV),translating into an increased treatment burden for the county. Most of the HIV financing by both the county government and development partners has been redirected to care and treatment programs which have result to improved health outcomes of PLHIV. However, this approach where treatment programs are preferred in financing to preventive programs, is indeed unsustainable strategy in addressing new HIV infections across the county. Deliberate efforts to strike a balance between financing of both treatment and preventive programs, strengthening behavior change communication among adolescents and young adults and promote safe sexual behaviors is paramount to the prevention of new
infection across the county.

Vulnerability identified during the survey within the PAPs as shown below was composed of: -

1. Household headed by children under 18 years (58.3%)
2. Women headed households/widows (33.3%)
3. The sick/chronic illnesses (8.3%)

Figure 5-30: Perceived Level of Vulnerability



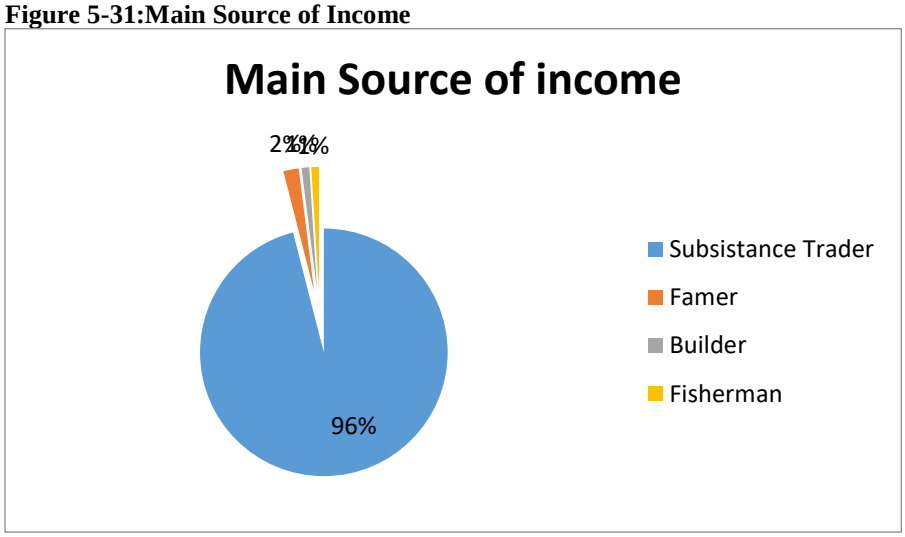
Source: Survey Data

5.11.9 Employment

The level of unemployment in the County has remained high since independence but has worsened due to recent tourism industry recession. While Vision 2030 MTPs target boosting the creation of high-productivity wage jobs as well as supporting of the non-farm self-employed sector, a large proportion of the county population still engage in subsistence family farming and low-productivity self-employment including hawking, even as wage work has expanded. The county government will accept hawking as part of the legitimate economy and provide urban space for them to operate and thrive alongside other self-employment initiatives, which are part of the government's strategy of creating the right incentives for better-paying wage jobs by stimulating manufacturing and industrial growth.

The level and quality of education has a significant pay-off in terms of jobs and earnings. Most youth in Kilifi suffer poor educational attainment, which has led to unemployment due to insufficient employable skills. The county will address this by tapping on the existing opportunities to deliberately educate the youth so as to bridge the gap that is likely to emanate from high level of attrition of the work force. Education opens up greater possibilities of wage employment and higher earnings. The current provision of public education is of uneven quality, with rural areas of the county likely to have much poorer facilities and outcomes. The government and its stakeholders are working towards improving the quality of primary education across the county, and expand the opportunities for secondary education (building more secondary schools), so that it is accessible to all "Kilifians", regardless of their socio-economic standing.

Figure 5-31:Main Source of Income



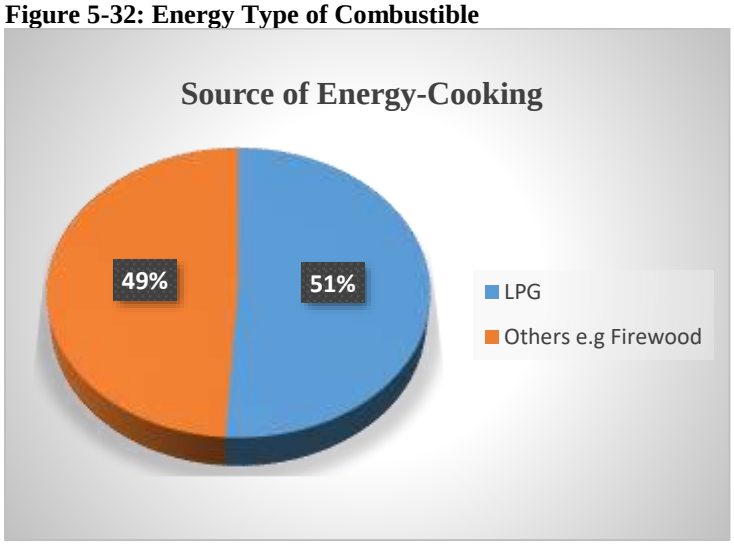
Source: Survey Data

5.11.10 Energy

Over 80% of the population in the county relies on wood fuel for their energy needs, a fact that has led to destruction of forests in the county. Access to electricity and solar energy technologies is estimated at 21% and 6% respectively. Those that have access to liquefied petroleum gas and paraffin is estimated at 2% and 8% respectively. According to Kenya National Bureau of Statistics (KNBS) and Society for International Development (SID), 2013, the potential for investment in renewable energy sources is high given that the county receives over 6 hours of sunlight, with an average of Direct Normal Irradiation (DNI) ranging between 4.0kW2/s in the hinterland areas around the western parts of Magarini sub county to 6.75 kW2/. Strong winds on land with an average speed of between 5-71m/s present a significant opportunity for development of renewable wind energy.

In addition, the Indian Ocean is a potential source of off shore energy. This is indeed exemplified by the strong winds, waves, tides and temperature that can be tapped for the development and generation of renewable marine/blue energy. The exploitation of renewable energy option is important especially in the light of the wanton environmental degradation that has been witnessed majorly in the arid and semi-arid parts of Malindi, Kaloleni, Ganze and Magarini where deforestation resulting from charcoal burning has reached alarming levels. Inadequate technical capacity and lack of data on the existing potential remain a key constraint in this regard. Therefore, there is need to conduct thorough feasibility studies to quantify the opportunities for developing marine renewable energy sources so as to maximize returns from investments in the sector.

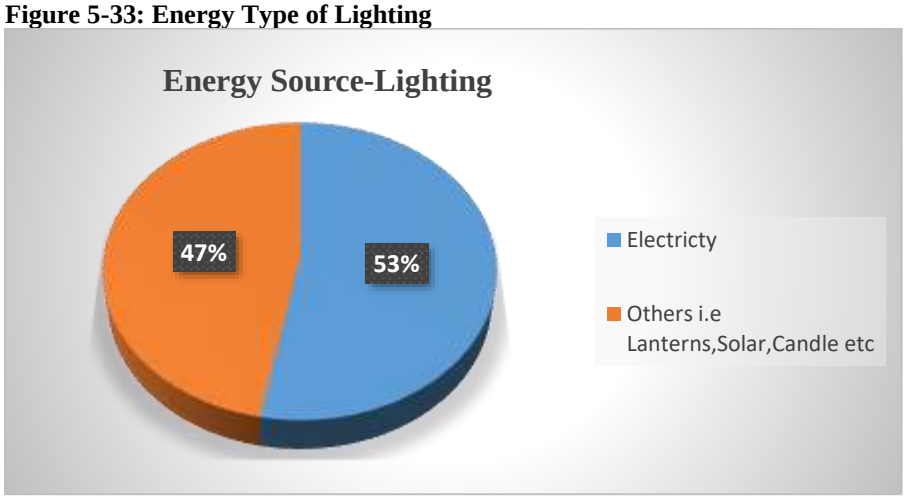
Figure 5-32: Energy Type of Combustible



Source: Survey Data

47.0% of the respondents indicated that their source of lighting was electricity. Other surces included lanterns/kerosene lamps, diesel generators, solar, candle at 53% as shown in figure 5-33.

Figure 5-33: Energy Type of Lighting



Source: Survey Data

5.11.11 Water and Sanitation

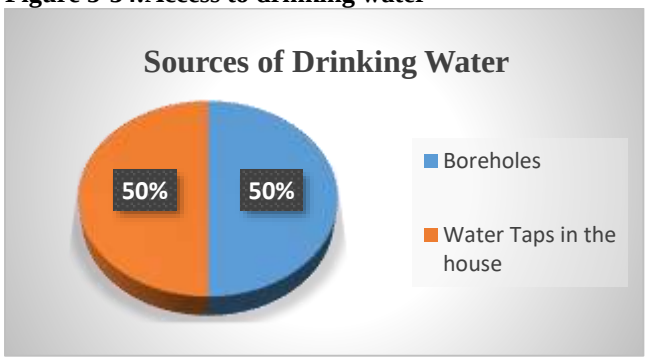
The section describes existing water resources, water supply schemes, sanitation, waste management, water status, water sources and access and existing opportunities for water resources development and water management in the County.

Water Resources

The county is endowed with tremendous wealth of both surface and underground water resources. River Sabaki which is the largest river within the Athi River Catchment, along with Rare, Kombeni, Mwandeje and Nzovuni Rivers drain into the Indian Ocean at various points along the coastline. Water pans and earth dams are mostly found in the arid and

semi-arid parts of the county such as Kaloleni, Ganze and Magarini sub-counties with 19.1% of the population in the county depending directly on water pans and earth dams for their water needs. Largely the surface water sources are unprotected and hence prone to contamination. The socio-economic survey outcomes concluded that tap water and boreholes were the main source of water at 50% each in terms of proportionality.

Figure 5-34:Access to drinking water

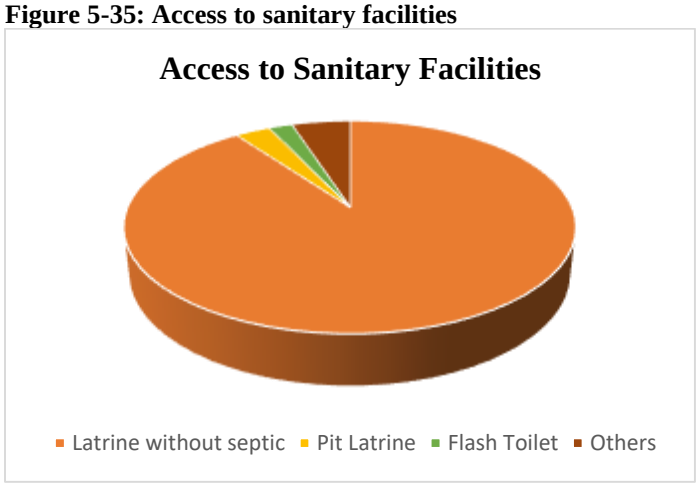


Source: Survey Data

Sanitation

The main sanitary facility used by the community interviewed within the project area was latrine without septic tank (90.0%).

Figure 5-35: Access to sanitary facilities



Source: Survey Data

5.11.12 Trade and Industry

The County's trade potential exists in its geographical positioning on the shoreline of the Indian Ocean, its proximity to the international Sea Port in Mombasa County and the Standard Gauge Railway (SGR) that passes through the County's Mazeras and Mariakani towns. It also has active small ports with a huge potential for expansion to international standard at Mayungu and Takaungu. Two international trunk roads pass through the County to the East and South, in addition to having an elaborate network of national and county roads. The County is home to the Malindi international airport and within close reach of Moi international airport in neighboring Mombasa County. As a neighboring

County of Mombasa City, the County hosts and has potential for more Special Economic Zones (SEZs), Export Processing Zones (EPZ) and other industrial parks. With the longest shoreline, there is great potential for trade in fish, fish products and related services apart from trade in several cash crops and related goods and services.

Kilifi has several mineral deposits found in various parts of the county ranging from Titanium, Coal, Barytes, Gypsum, Limestone, Lead, Zinc, Silver, Manganese ore, Titanium, Iron Ore, Mercury to Sand and Coral Rock. The most exploited are limestone, coral rock and sand, upon which three (3) cement factories and the building construction industry within and adjacent counties are anchored. The County has plenty of productive land, with potential for investment in various agriculture-based industries including horticultural crops production and processing, coconut, cashew nut and other crop processing, as well as dairy and beef industries.

Close proximity to Baricho water works gives the county unlimited supply of fresh water for industrial use with highly skilled manpower that can be tapped for greater productivity. The County is also keen on protecting its consumers through fair trade practices by ensuring that trade weighing and measuring equipment are tested and verified.

5.11.12.1 Markets

The County boast of 78 trading centers with 31,998 licensed retailers and 641 wholesalers. The major towns are; Kilifi, Malindi, Mtwapa, Mariakani, Kaloleni, Watamu among others. An elaborate transport network and link with major centres nationally, across east Africa and globally give Kilifi County unlimited trade opportunities. The County is the leading national source market for cashewnut and coconut; and the potential to transform its economy through local and international trade in fish and fisheries products, fruit (pineapples, mangoes, oranges) products, coconuts, dairy and beef products and many others. Potential and existing tourism products give Kilifi an unrivalled competitiveness as a tourist destination nationally. The County has a total of seventy two (72) physical markets distributed across the entire County with forty six (46) being open air and twenty six (26) county built markets.

5.11.12.2 Industrial Parks

The County is a major industrial zone in the coast offering ample space for industrial establishment. The area near Mtwapa, Kilifi, Vipingo and Mazeras towns provide good sites for industrial location and has attracted EPZ industries and other food processing plants as well as cement manufacturing plants. The proximity to large markets in Mombasa and availability of a relatively good road network has enabled the County to be a choice destination for major industries in the region. Kilifi County trades in both locally produced agricultural and industrial products. The County is the major source of cashew nut and sisal products that constitute part of the country's export to the rest of the world. Sand mining and salt manufacturing industries are major trade and industry activities in Magarini constituency. There is potential for increasing the manufacturing and processing industries from the current 22 by establishing more fruit processing factories, coconut and cashewnut as well as milk processing factories. To harness the cottage industries the County has 4 jua kali sheds located in Gongoni, Vipingo, Malindi and Kaloleni.

5.11.12.3 Micro, Small and Medium Enterprise

The Micro, Small and Medium Enterprises comprise of distribution and wholesale, retail and informal trade, international trade, trade in services and electronic trade. Vision 2030 has identified and earmarked wholesale and retail trade among other sectors for rapid growth and development due to the sector's immense contribution to Kenya's Gross Domestic Product (GDP) and employment.

5.11.12.4 Major Industries

The County's proximity to the international Sea Port in Mombasa County which is a gate way to east and eastern Africa countries and the world at large, gives it a geo-positioning advantage as a most suitable county for investments in different areas. The county currently has 22 manufacturing industries which include soft drink manufacturing industries in Mtwapa, Salt manufacturing industries in Gongoni and Marereni, cement manufacturing industries in Rabai, Vipingo and Kaloleni and Steel manufacturing industries in Mazeras and Mariakani among others.

5.11.12.5 Financial Services

The county is served by 14 commercial banks and about 10 micro finance institutions which are mainly located in major towns like Mtwapa, Mariakani, Kilifi and Malindi. Major Banks include KCB, Co-operative Bank, Equity, Sidian, National Bank, Post Bank, Eco Bank, Kenya Women Finance Trust Bank, NIC, Barclays, Standard Chartered, Stanbic, Jamii Bank, Chase Bank, Imperial and Diamond Trust Bank. The main Micro finance institutions in the county include Rafiki Micro Finance, SMEP, Faulu, Yehu, Kenya Women, Fadhili, Platinum Credit, and Jitegemee among others. Most financial institution are located in major towns which limits banking access and financial services to those in remote areas like Rabai, Magarini and Ganze. However, presence of merry go rounds, table banking, Village Savings and Loans associations (VSLAs),Savings and Credit Societies (SACCOs) as well as agency banking and mobile money agents has helped alleviate this problem. Cash transfer programmes in the county have introduced banking services to the unbanked segment of the community including the elderly, the OVCs and the vulnerable members of the community thereby boosting the demand for banking services in the rural areas.

The county has 171 SACCO societies which can broadly be classified as Urban and Rural Saccos. These SACCOs have played a great role in mobilizing savings from their members and giving out affordable loans. Two SACCOs namely Imarika and Lengo SACCO operate Front office Savings Activity (FOSA) in the county. Lengo has branches in Malindi and Kilifi while Imarika has branches in Kilifi,Mtwapa,Malindi, Bamba, Mariakani, Kwale and Garsen.Other government financial providers include, Agriculture Finance Co-operation, Youth Enterprise Fund, Women Enterprise Fund and Kilifi Micro Finance Fund commonly Known as the Mbegu fund also operate in the county.

5.11.12.6 Cooperative Societies

Co-operatives play an important in enhancing the optimal performance of agriculture and other productive sectors of the economy of Kilifi County. Cooperatives leverage the

financial capacity of members through increasing access to affordable credit facilities as well as assisting members in marketing their produce. The county has both agricultural and non-agricultural co-operatives. Agricultural Co-operatives deal with livestock, dairy, horticulture, dry produce, fisheries and land buying while non-agricultural are SACCOs,housing, sand harvesting,handicraft, quarrying, artisan and transport cooperatives among others.

The county had a total of two hundred and sixty (260) registered co-operatives, out of these 150 were active while the rest were dormant in 2018. Most farmers' co-operatives for major cash crops in the county ran dormant due to policy changes that saw the emergence of a competitive and unfavorable market economy. The poor performance of the tourism sector also led to the collapse of hotel based cooperatives. SACCOS remain the most vibrant societies in the subsector and have continued to register tremendous growth in recent times. The county boasts of 171 Sacco societies of which two (2) are licensed to carry out deposit taking business (FOSA). The county has agro marketing co- operatives doing value addition in the dairy, mango, chilli and honey value chain. However there exists more potential in Agro-Marketing Societies and hence strengthening them is paramount for improved incomes and livelihoods. Deliberate efforts should therefore be put in place towards reviving the dormant co-operatives to enable them play their rightful role in developing the county.

5.11.13 Tourism and Wildlife

The section captures vital income of the main tourist's attraction sites and tourism activities. Hotel and accommodation facilities including the bed capacities is also illustrated. The existing opportunities for investing in the tourism sector targeting both international and domestic tourism is also captured.

6 STAKEHOLDER CONSULTATION

This chapter provides a description of the main stakeholders of relevance to the project and a summary of stakeholder engagement activities undertaken during the preparation of the ESIA.

6.1 Stakeholder Engagement Principles

CWWDA understands that effective stakeholder engagement and public consultation is a cornerstone of successful project development, and is committed to free, prior, and informed engagement with stakeholders throughout the project lifecycle. The key principles guiding CWWDA approach to stakeholder engagement on this Project are:

Box 6-1:Stakeholder Engagement Principles

- To be open and transparent with stakeholders.
- To be accountable and willing to accept responsibility as a corporate citizen and to account for impacts associated with the Project activities.
- To have a relationship with stakeholders that is based on trust and a mutual commitment to acting in good faith.
- To respect stakeholders' interests, opinions and aspirations.
- To work collaboratively and cooperatively with stakeholders to find solutions that meet common interests.
- To be responsive and to coherently respond in good time to stakeholders.
- To be pro-active and to act in anticipation of the need for information or potential issues.
- To engage with stakeholders such that they feel they are treated fairly, and their issues and concerns are afforded fair consideration.
- To be inclusive and accessible to stakeholders so that they feel able to participate; to receive and understand information; and to be heard.

6.2 Stakeholder Engagement Objectives

The objectives of this stakeholder engagement are as shown in **Box -6-2** below

Box 6-2: Stakeholder Engagement Objectives

- To identify and map all relevant stakeholders, their context, interests and concerns;
- To establish a two-way dialogue to understand concerns, management options and external perspectives;
- To promote and secure participation of PAPs by building their capacity for informed participation with special attention given to vulnerable PAPs in key decision making;
- To build and maintain trust between stakeholders;
- To support the resolution of emerging tension and maintain the project's social license to operate;
- To manage stakeholders' expectations;
- To facilitate the collection of quality primary and secondary information relevant; to the project processes including monitoring;

- To triangulate data collected and analysis done to inform decision making;
- To document information disclosed and public consultation efforts;
- To comply with regulations and requirements on disclosure and consultation;
- To provide information about the project and its potential impacts to those interested in or affected by the project, and solicit their opinion in this regard;
- To identify additional impacts/issues and possible mitigation measures;
- To inform the process of developing appropriate mitigation measures and facilitate consideration of alternatives and trade-offs (if any);
- To reduce chances of conflict through early identification of contentious issues;
- To ensure transparency and accountability of decision-making; and To increase public confidence in the project.

6.3 Stakeholder Mapping and Identification

Stakeholders include individuals or groups that may influence or be impacted by the Project, as described in **Box 6-3** below.

Box 6-3: Definition of a Stakeholder

Stakeholders are persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively. Stakeholders may include locally affected communities or individuals and their formal and informal representatives, national or local government authorities, politicians, religious leaders, civil society organizations and groups with special interests, the academic community, or other businesses."

The level of interest and impact of any given group of stakeholders is dependent on a number of factors including level of authority, socio-economic context, influence, education and cultural factors. Stakeholder identification began at Project inception and planning and has continued through the various stages of the Project development.

Stakeholders identified to date represent the organizations and individuals who may be directly or indirectly (positively or negatively) affected by the project or who may have an effect on how the Project is implemented. Stakeholders identified for inclusion in engagement activities meet one of the following criteria:

1. Have an interest in the Project;
2. Would potentially be impacted by or have an influence on the project (negatively or positively); and/or,
3. Could provide commentary on issues and concerns related to the Project.

6.4 Approach and Methods of Stakeholder Engagement

Below is a summary of the approaches and strategies adopted throughout the stakeholder consultation exercise.

6.4.1 Mobilization

- **Introduction letters:** CWWDA provided the consulting team with official letters of introduction informing all stakeholders about the proposed project, introducing the ESIA consultant, informing about the planned consultation activities and requesting them to support the consultants wherever possible.
- **Mobilization through local administration:** CWWDA and the consulting team visited the offices of the local administrators and informed them about the proposed project and the upcoming consultation activities. Other than information sharing, these meetings were aimed at requesting the administrators to further mobilise the concerned stakeholders. Local administrators consulted included the local chief, sub chief, ward administrator and the village administrator.
- **Mobilization by phone and emails:** The local communities were invited through their local leaders e.g the chiefs,village elders etc. Other key stakeholders who were not available due to conflicting obligations were contacted either through email or by phone. This mainly applied to custodians of relevant data and literature for the ESIA study.
- **Confirmation of appointments:** Prior to the appointment dates, the ESIA consultant reconfirmed the appointments by contacting the focal persons at each venue at least one day prior to the meeting to verify whether the proposed schedule was still valid for the expected audience.

6.4.2 Interviews and Socio-Economic Surveys

Enumerators were employed during the stakeholder consultation period to undertake socio-economic surveys with key community members and stakeholders. A quantitative survey was conducted using structured questionnaire designed to generate the required information. The information gathered was used to answer questions related social and economic parameters of the communities within the project site including, the availability or lack of social service facilities, existing levels of access to education, health, potable water and related services. Consultations were held using both formal and informal meetings with carefully selected members of the communities and all PAPs.

6.4.3 Focused Group Discussions and Public Barazas

Stakeholders were further consulted in two ways; through public barazas where members of the community were called to a meeting with the agenda of discussing the proposed Project and through Focus Group Discussions (FGDs), where different groups were isolated and interviewed in a culturally appropriate setting. The FGD groups included women, youth and men. The views and recommendations expressed during the consultation meetings were incorporated in the ESIA report. Generally, the result of the participation showed support for the proposed project, with the community looking forward to the anticipated socio-economic developments associated with the project.

Table 6-1: Overview of Stakeholder Groups

Stakeholder Category	Stakeholder Group	Connection to the project	Stakeholders
National Government	Key Ministries National Regulatory bodies Government Agencies	National government are responsible for establishing policy, granting permits or other approvals for the Project, and monitoring and enforcing compliance with Kenyan Law throughout all stages of the Project life	Mombasa county. commissioners office Deputy County Commissioner's Office,: Changamwe Sub County Deputy County Commissioner's Office-Jomvu Sub Count County Commissioner office: Kwale County Deputy County Commissioners office Samburu Governor's office, Kwale County Deputy County Commissioner Mombasa County Chiefs and Assistant Chiefs in affected locations and sub locations
County Government	County Governments	County Governments are responsible for approval of development plans	Governor's office Mombasa County Governor office Kwale County Governor office Kilifi County
Parastatals	Government funded private enterprises in charge of managing specific activities.	Parastatals may have land or other assets which could be affected by the Projects CWWDA is the owner of the transmission pipeline and water network.	Kenya National Highway Authority Kenya Urban Roads Authority Kenya Railways Corporation Kenya Forest Service NEMA Mombasa Water and Sanitation Company
Communities or Settlements	Project affected communities along the project routing including: Landowners and users; Community members who use access roads to access nearby natural resources; social/public infrastructure and services. acquisition and restrictions to land, to participate in the finalization of agreements around compensation and livelihood restoration and take active ownership	Households and communities that may be directly or indirectly affected by the proposed Project and its activities. This includes people living on land affected by the Project, through direct land take or by social and environmental impacts, and other people who visit or use land or resources that may be affected. Primary stakeholders include landowners and land users. These communities need to be engaged around Project impacts (construction and operations). Land affected households shall be informed about land acquisition and restrictions to land, to participate in the finalization of agreements around	Directly and indirectly affected community members from: Affected Community Members and Infrastructures Households losing access to land Households losing access to livelihood resources Households with houses at risk of displacement

	of the resulting implementation of these measures.	compensation and livelihood restoration and take active ownership of the resulting implementation of these measures.	

Table 6-2: Mombasa County Stakeholder Consultations Venues, Dates and Number of Participants

Date	Venue	Participants	Males	Females
3/11/2022	CWWDA Office	9	7	2
3/11/2022	County Commissioners office -Mombasa	3	3	0
25/11/2022	Governor's Office- Mombasa County	3	3	0
9/11/2022	Deputy County Commissioner's Office-Jomvu Sub County	4	3	1
25/11/2022	MOWASCO Offices	3	3	0
7/11/2022	Chief Officer Public Works-Mombasa	3	3	0
9/11/2022	Regional Director's Office-KeNHA	4	4	0
9/11/2022	Deputy Regional Director's Office, KURA	3	3	0
8/11/2022	Kenya Railways-Mombasa Regional Office	7	7	0
25/11/2022	NEMA Offices -Mombasa	3	3	0
7/11/2022	KFS Office -Mombasa	3	3	0
Total		**45**	**42**	**03**

Table 6-3: Mombasa County Public Consultations, Dates and Number of Participants

Date	Venue	Participants	Males	Females
14/11/2022	Jomvu-Miritini	116	60	56
15/11/2022	Mikindani-Birikani	102	77	25
Total		**218**	**137**	**81**

Table 6-4. Kilifi County Stakeholder Consultations venues dates and Number of Participants

Date	Venue	Participants	Males	Females
25/11/2022	Kilifi County Governor's Office	4	4	0
3/11/2022	County Commissioner's Office	3	3	0
3/10/2022	DCCs Office Rabai	5	3	2
2/11/2022	Department of Water and Environment	3	3	0
26/10/2022	Department of Lands	3	3	0
26/10/2022	NEMA–Kilifi	3	3	0

7/11/2022	Department of Public Works and Infrastructure	3	3	0
26/10/2022	Kilifi Mariakani Water and Sanitation Company	3	3	0
9/11/2022	KeNHA-Offices	4	4	0
Total		**31**	**29**	**02**

Table 6-5: Kwale county stakeholder consultations venues dates and number of Participants

Date	Venue	Participants	Males	Females
25/10/2022	Chief Officer's Office	5	3	2
25/10/2022	County Commissioner's Office	3	2	1
25/10/2022	Govenors Office, Kwale	3	2	1
25/10/2022	Department of Lands-Kwale	3	2	1
25/10/2022	Department of Environment	3	2	1
25/10/2022	Kwale Water and Sewerage Company	3	3	0
25/10/2022	NEMA-Kwale	4	2	2
26/10/2022	Deputy County Commissioner's Office-Samburu	5	4	1
Total		**29**	**20**	**9**

Table 6-6: Kwale County Public Consultations, Dates and Number of Participants

Date	Venue	Participants	Males	Females
3/11/2022	Mwamdudu-Bonje	96	56	40
Total		**96**	**56**	**40**

The comments and concerns raised by the community during stakeholder consultation and the responses given by both the consultants and the client are highlighted **Table 6-6 below**. Meeting minutes and attenandce sheets are presented in Annex A.

Table 6-7: Summary of Concerns raised by the Project-Affected Person/ Other Stakeholders

Theme	Comments and Issues	Response

Waste Generation	Stakeholders were concerned about waste generation and methods of waste disposal during project implementation.	The consultants informed community members that the ESIA report shall recommend that a waste management system be put in place; Waste shallalso be handled and transported by NEMA certified waste handlers.
Noise and Vibration	Questions concerning potential air and sound pollution arising from excessive noise and vibration also arose from community members	The consultants informed the stakeholders that the project will be using up to date technologies to improve efficiencies to reduce noise and vibrations and further mitigation measures will be recommended in the ESMP.
Water Quality	The community raised concerns on impact of the project on water quality. They stated that water resources may be contaminated by project waste rendering it unfit for human consumption. They were also concerned about over abstraction during project implementation.	The consultants informed the community that the ESIA shall propose that a waste management system be put in place. Stakeholders were also informed that the project had taken into account the estimated water usage for the project and made plans for alternative water sources to ensure adequacy of water for the project without depleting local resources.
Biodiversity	Stakeholders wanted to know whether the project proponent had taken into account the impact of cutting down trees on the basin area (catchment) as well as local weather patterns. Further, they inquired whether they would be compensated for all the trees that would be cut down to clear the project area. They were also concerned about reduction in flora diversity and change in vegetation cover as only low growing vegetation would be allowed to grow in the project area.	The team informed the stakeholders that a RAP study shall be undertaken separately and all the affected assets including trees will be documented and the owners compensated. Additionally, the project shall be designed in a way that ensures very minimal bush clearance. The PAPs shall also have the right to salvage all assets affected
Air Pollution	Some of the stakeholders feared that the project will generate emissions and generate dust leading to air pollution.	The consultants informed the members that the project will be using up to date technologies to improve efficiencies to reduce emissions and mitigation measures shall be put in place to reduce emissions in line with national air quality regulations and international best practice.
Employment	Community members inquired whether there will be employment opportunities and what would be the criteria for gaining access to such opportunities. They decried an ongoing pattern of contractors hiring persons who don't reside in their localities to carry out tasks that locals are	The consultants informed stakeholders that they have incorporated the development of a Community Engagement Plan and a Labour Recruitment Plan in the ESIA.

	capable of doing and requested that, in this project, they be given first priority whenever employment opportunities arise. Female participants were especially concerned that they would not be given opportunities to work in the project because of societal perceptions that they are physically weak and are exclusively responsible for domestic affairs. In addition to this, they foreshadowed possibility of rise in incidences of children dropping out of school to take up paid labour in the project.	These plans shall cover all employment issues ranging from recruitment, dismissal, hours of work, non-discrimination, child labour, fair remuneration and grievance management. Stakeholders were however cautioned that where specialist skills are required for the project and the skills are not locally available, specialist would be hired from other jurisdictions through a competitive process.
Land use and Compensation	The members noted that they would incur loss of land and property since residents may be required to relocate. They noted that relocation would interfere with their economic affairs and separate them from their kin. They inquired about the land acquisition process, timelines for compensation, persons entitled to compensation and the amount of money to be paid per head. They were also concerned that news about compensation may result into land purchase for speculative purposes and that unscrupulous characters may disinherit rightful owners by acquiring fake title deeds.	The community was informed that a RAP study has been commissioned and will be conducted and implemented in accordance with World Bank Standards and national legislation. This shall ensure that all affected persons are compensated in a fair and timely manner. Compensation shall be done following proper identification of affected persons and thorough valuation of their assets. They were further informed that the RAP process would incorporate grievance-handling mechanism to settle any disputes that may arise.
Community benefits and Corporate Social Responsibility (CSR)	The communities wondered whether there would be any direct benefits flowing to them as a result of the project. They stated the need for boreholes, market infrastructure and bursaries for school going children as critical community needs.	CWWDA will provide for a CSR item in the bidding document to be implemented as a direct benefit to the community outside water provision. Aside from this, there will be indirect benefits arising from the project including employment of local residents in particular skilled women, youth and persons with disabilities.
Social impacts	It was a concern of the community members that the proposed project will increase the population in the project area and its surroundings which could lead to socio-cultural diversification and cultural contamination	The consultants and the clients' team informed the community that it shall put in place sufficient safeguards to mitigate such incidences through for instance, developing and implementing a grievance redress mechanism; putting in place a sexual harassment policy and a HIV/AIDs prevention and awareness plan.

	There were fears that with the increase in population, there will be an increase in the spread of HIV and AIDS, teenage pregnancies, drug and alcohol abuse and prostitution. Further they stated that enhanced economic status particularly among the women and youth would lead to increased occurrences of SGBV. Concerns were also raised about competition for limited resources due to population influx. This would particularly manifest in inadequate housing and shortage of water supply.	The proponent will also work closely with other government agencies, in particular law enforcement and social protection offices to curb increase in crime in the project area. An Influx Management Plan shall be developed by the consultant as part of the C-ESMP to manage impacts related to labour. However, the skills required for the project are majorly semi-skilled and the expectation is that the workers will be hired from within the Counties hence not requiring "foreign" workers.

6.4.4 Post ESIA Consultations

CWWDA is aware that public consultation is a key component of project implementation therefore put in place a Stakeholder Engagement Plan (SEP). The overall aim of SEP shall be to address the concerns and opinions of the stakeholders with the ultimate view to assuring a smooth project implementation. CWWDA shall welcome suggestions and information from relevant stakeholders, contractors, visitors and the general public. Community Liaison Officers (CLOs) shall be appointed by the contractor and shall address complaints and suggestions from the communities. Further, consultations, which began during the ESIA process, shall continue throughout the project life cycle in line with the SEP.

6.4.5 ESIA Study Report Disclosure

This ESIA study report shall be disclosed for public comment by NEMA in accordance with the NEMA EIA/EA regulations as well as WB's disclosure policy. The report upon approval by NEMA shall be disclosed in CWWDA website and NEMA's website as well as Bank External Affairs website.

7 ANALYSIS OF PROJECT ALTERNATIVES

This chapter describes the analysis of technically and financially feasible alternatives considered in the development of the Project and provide documentation of the rationale for selecting a particular option. The purpose of the alternatives analysis is to identify feasible alternatives that could improve the sustainability of the Project's design, construction and operation.

7.1 No Project Alternative

The County of Mombasa will not be able to realize the dream of improving access to clean water to its residents. This will also hamper efforts to achieve Vision 2030 and the Sustainable Development goal 6. Thus it is prudent for the project to be implemented for the good of the West Mainland residents who have grappled with water shortage problems for years

7.2 Technology Alternative

The two options used for trenching works and laying of pipelines can be done using two main methods, mechanized methods or human labour to dig the trenches, lay the pipelines, and cover the pipes after laying. Using machines in the trenching process will indeed be faster and more efficient in working, however, the machines will require a larger wayleave and maneuvering room leading to more inconvenience in terms of traffic along the roadside, or cause massive destruction of property to make room for the machines. Using human labour to dig trenches will require less space for working as well as provide benefits in form of employment and community buy in. During consideration of these alternatives to the project, the best option which was considered in this ESIA, is to make use of human labour for trenching, and burying of trenches, machinery can be used to ferry and lift the heavy pipes. However in areas where it is difficult to use human labour (hard ground, rock surfaces, unsafe areas, etc.), machinery for trenching will be used.

7.3 Alternative Project Route

Two options have been considered for water transmission from the proposed West Mainland Reservoir to the West Mainland demand area and to the Changamwe Reservoirs.

Option 1. Under pipeline route option 1 a common transmission main, total length 11.6km, feeding the West Mainland Supply Area and Transmitting the Island allocation to the Changamwe Reservoirs.

Option 2 is a dedicated transmission mains for the Island and West Mainland, comprising of a twin transmission main, with one pipeline dedicated to transmit the Island allocation to the Changamwe reservoirs and the second pipeline exclusively feeding the West Mainland demand area. Results of hydraulic analysis of the twin water transmission pipeline to the West Mainland and Changamwe.

Table 7-1: Project route options

Parameter	Comparison		
	Route Option 1-Rejected Option	Route Option 2 Preferred Option	Comments
Pipeline Length	11.6km	20.6km	Option 2 presents a technical advantage in that a downtime in operation of one line due to repairs,etc. will not affect the other.
Accessibility	Section along Nairobi- Mombasa Highway is accessible.	Section along Nairobi-Mombasa Highway is accessible.	Option 2 presents a technical advantage in that a downtime in operation of one line due to repairs,etc. will not affect the other.
Pipeline size	Varies between DN 800 and DN1200 for each section for the entire length (based on Preliminary Hydraulic Sizing)	Varies between DN 800 and DN1200 for each section for the entire length (based on Preliminary Hydraulic Sizing)	There is a slight impact on the Pipeline size due to the difference in length, with cost implications.
Topography	Generally hilly terrain. More river crossings compared to route option 2. This may necessitate more air valve and wash out requirements	Relatively gentle slope form West Mainland reservoir to the Changamwe reservoir	Relatively gentle slope form West Mainland reservoir to the Changamwe reservoir
RAP requirements	RAP required for the entire pipeline route	Reduced RAP requirements on sections within existing road reserve.	Option 2 will require slightly less area of easement to be acquired.

7.4 Alternative Materials

Materials commonly used to construct water pipes include polyvinyl chloride (uPVC), cast iron, copper, steel and in older systems concrete or fired clay. Joining individual water pipe lengths to make up extended runs is possible with flange, nipple, compression or soldered joints. In this project, the use of concrete, cast iron and copper was considered but rejected. The type of pipelines to be used will be polyvinyl chloride (uPVC) and galvanized pipe steel. This galvanized coating keeps the water from corroding the pipe. The project will also use High-Density Polyethylene (HDPE) or Polyethylene High-Density (PEHD) is a thermoplastic polymer produced from the monomer ethylene with a high strength-to-density ratio, HDPE is used in the production of corrosion-resistant piping. The use of asbestos concrete pipes was rejected owing to the environmental and health risks and so is the use of concrete pipes or copper pipes due to cost implication and conformity with the best practice in the industry which has scaled down on their usage.

8 ASSESSMENT OF POTENTIAL RISKS AND IMPACTS

This chapter presents the assessment of the issues likely to arise as a result of implementation of the proposed project. For each issue, the analysis is based on its nature, the predicted impact, extent, duration, intensity and probability, and the stakeholders and/or values affected. In accordance with best practice, the analysis includes issues relating to the project's environmental and social sustainability. The anticipated positive and negative impacts associated with the different phases of proposed water supply project are outlined below:

8.1 Classification of Impacts

The significance of impacts has been determined by combining the perceived frequency of occurrence of the source of the impact, the duration, severity, and spatial extent of the impact and the sensitivity of the area being impacted upon. The analysis was aided by using the classification of impacts shown in chapter 2, tables 2-3, 2-6 and 2-7. The following table summarizes the activities to be undertaken during the implementation of the project.

Table 8-1: Summary of Activities to be undertaken during implementation

Phases	Action
Pre-Construction Phase	Land clearing and clearance
	Rehabilitation, extension and construction of access roads
Construction Phase (Estimated to last 24 months)	Construction and/or placement of provisional facilities (renting building for offices, machinery and equipmentwarehouses, concrete plant, crusher and screens)
	Transportation of consumables, equipment, materials
	Storage of materials, machinery and equipment
	Excavation, cuts, and filling-in
	Compaction and leveling
	Operations of provisional facilities (concrete plant, offices and warehouses) crusher,
	Restoration, cleaning, and signaling
	Transportation of consumables, equipment, materials and staff
	Storage of materials, machinery and equipment
Operation Phase	Maintenance and Surveillance
	Transportation of consumables, equipment and staff
	Land restoration in provisional roads and temporarily areas
Decommissioning Phase	May include dismantling and demolition of structures e.g. staff house, guard house and reservoir tanks which may require excavation to remove pipelines or leaving them on underground
	Transportation of consumables, equipment, materials and
	Cleaning and rehabilitation

8.2 Potential Beneficial/ Positive Impacts

8.2.1 Improved Access to Clean Drinking Water

With the implementation of the project, the water supply will be clean, stable and reliable hence more customers will be connected to the system. The people under the water supply will engage in other income generating activities in order to improve their economic status. An estimated 70,200m^3/day will be supplied to the population in West Mainland.

8.2.2 Employment

The construction of the transmission pipelines including operation and maintenance activities will provide employment opportunities–directly and indirectly–to skilled as well as unskilled work force primarily to local labor including women. The income, thus enhanced, of the local skilled and unskilled work force would also bring out a multiplier effect to other sectors of the economy.

8.2.3 Knowledge/Skills Transfer

Local workers will benefit in terms of knowledge transfer especially from external skilled workers who when paired with the local workers will transfer on-the job skills to them. Further, local workers may undergo certain training as part of skill enhancement prior to employment.

8.2.4 Local Material Supplies

Another positive impact of the project involves local material sourcing mainly sale of materials for use in the project. Some of these can be expected to be sourced locally and the rest through importation. It is expected that the project will generate additional income revenues for the local population across the county in harvesting and transportation of sand, ballast, stones and other construction materials. The additional income revenues received will create demand for other goods and services causing a trickledown effect to the entire economy.

8.2.5 Health

A positive induced impact is that improved water and sanitation will lead to less water and insect borne illness leading to a healthier, productive community, whose members will be able to attend school or carry out income earning activities. This also has a positive induced impact by reducing the burden on women and girls, who are often required to look after the ill members of the family or will be the first to miss out if opportunities are limited.

8.3 Potential Adverse Impacts

The potential negative impacts during construction are generally short-term, temporary and reversible impacts which can be reduced or eliminated by mitigation. Many of the impacts will only occur at active construction stage and mitigation measures have been set out in this report.

8.3.1 Displacement Impacts

This construction of the transmission line will lead to loss of land or restrictions on land use and land-based livelihoods during construction. Potential impacts include: -

- Physical displacement.
- Economic displacement.

The loss of access to land associated with the reservoir and ancillary facilities to be located at Bonje which will result in the loss of land used for crops, removal of trees. The land is privately owned by a single land owner. Another 273 PAHs will lose land where they are conducting their businesess along the RoW. These PAHs are categorized as encroachers and have no rightful ownership over the land.

Table 8-2.Construction Phase Impact Significance on Flora

Impact	**Permanent Loss of Livelihoods and Household Income during operations**			
Impact Nature	Negative	Positive	Neutral	
	The permanent land restrictions will lead to a permanent loss of livelihoods and household income. Permanent restrictions to the ROW corridor may also result in livelihood losses.			
Impact Type	Direct	Indirect	Induced	
	Potential loss of livelihoods and household income due to a direct interaction between the Project (i.e. land taken and restrictions) and land users/owners.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The loss of livelihoods and income associated to the restrictions for operation activities is considered to be permanent during the project operational life.			
Impact Extent	Local	Regional	International	
	Impact limited to the Study Area			
Impact Scale	The scale of the impact is considered low.			
Frequency	The impact will be felt continuously throughout the years of operation as the restrictions will apply throughout.			
Impact	Positive	Negligible	Small	Medium	Large
	Based on the parameters above and the relatively small amount of land permanently required for the project, the magnitude is considered small.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	The sensitivity of the receptors is considered high given the levels of dependence trade and their vulnerability to potential losses of livelihoods.			
Impact Significance	Negligible	Minor	Moderate	Major
	Considering the magnitude and sensitivity are small and high, the impact on livelihoods and household income during operation activities is considered to be of moderate significance.			

Mitigation Measures

A Resettlement Action Plan report has been prepared and 274 Project Affected Households (PAHs) have been identified who shall be compensated for the loss of structures and income based on the World Bank OP 4.12. Out of the 274 PAHs, there is one land owner who is entitled for compensation for loss of land and 273 PAHs who are categorized as encroachers on the GoK ROW and entitled for compensation for loss of structures and income only.

8.3.2 Impacts on Flora

Recognizing that the proposed site is in a peri-urban and inhabited area where tertiary types of ecosystems are already dominant, it is unlikely to expect significant negative impacts on flora and fauna from this project.

A temporary loss of habitat along the work site could reduce the carrying capacity of the home ranges of the fauna, especially until vegetation cover is re-established where possible via landscaping. However, the majority of species present in the project area, are common and widely distributed throughout the area and the loss of a few individuals will have a negligible impact on the overall population both at local and regional level. In this project, low impact is expected on vegetation and any fauna in the area since the project site is devoid of significant unique floral and faunal life. The water transmission pipelines will be built in an area that is already inhabited.

The clearing of project site through excavations and construction will not adversely affect flora and fauna and all the impacts caused by construction work on flora and fauna are of temporary and reversible in nature and can be mitigated by appropriate good working practices that will be prescribed by the ESMP. The magnitude of the impact is considered to be low. Based on the analysis provided above, the impact of vegetation removal, habitat fragmentation and degradation will be a low negative impact pre-mitigation (Table 8-3).

Table 8-3: Construction Phase Impact Significance on Flora

Impact	**Flora and Vegetation during Construction**			
Impact Nature	Negative	Positive	Neutral	
	Disturbance to vegetation and habitat loss during construction			
Impact Type	Direct	Indirect	Induced	
	Impact is as a result of a direct interaction between the project (i.e., construction activities) and the existing vegetation on project site			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The effect is considered permanent as the areas where vegetation will be removed for the construction.			
Impact Extent	Local	Regional	International	
	Impact is limited to AoI			
Impact Scale	The impact is considered low in scale because the project site is devoid of any significant vegetation and general area has been modified thus there is a decreased risk of impacts to vegetation in these areas.			
Frequency	Once off			
Impact Magnitude	Negligible	Low	Modertae	High
Resource/ Receptor Sensitivity/Value/ Importance*	Low	Medium	High	
	The project is not located in any sensitive ecosystem and is within an already modified habitat.			
Impact Significance	Negligible	Minor	Moderate	Major
	Considering the impact magnitude is low and the sensitivity is low, the overall significance is considered to be of minor significance.			

Operation Phase

During the operational phase there is the potential for impacts on vegetation and flora as a result of the existence of the project. Due to the inexistence of surrounding protected areas nor sensitive habitats the impact of the operation is expected to have a low sensitivity. The impact is directly negative, will be permanent during the project life period. The extent of the impact is restricted to the Project site and therefore local in nature. The magnitude of the impact is considered to be small. Based on the analysis provided above, the impact of direct loss of vegetation and flora and degradation and fragmentation of habitat will be of ***minor*** significance pre-mitigation.

Table 8-4: Operation Phase Impact Significance on Flora

Impact	**Flora and Vegetation during Operations**			
Impact Nature	Negative	Positive	Neutral	
	No impact			
Impact Type	Direct	Indirect	Neutral	
	No impact			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	No impact			
Impact Extent	Local	Regional	International	
	Impact is limited to AoI			
Impact Scale	The impact is considered low scale as most of the impacts related to vegetation removal occurred during the construction phase.			
Frequency	Once off			
Impact Magnitude	Negligible	Low	Moderate	High
Resource/ Receptor Sensitivity/Value/ Importance*	Low	Medium	High	
	The sensitivity is considered low as most of the major impacts on the vegetation and flora will occur during the construction phase.			
Impact Significance	Negligible	Minor	Moderate	Major
	Considering the impact magnitude is small and the sensitivity is low, the overall significance is considered to be of minor significance.			

Mitigation Measures

The following standard mitigation measures shall be employed:

- Removal of vegetation shall be avoided and removed only when absolutely necessary.
- Whenever possible, all damaged areas shall be reinstated and rehabilitated upon completion of the contract to as near pre-construction conditions as possible.

Decommissioning Impact on Flora and Vegetation

The impacts on flora and vegetation will be **minor** and temporary impacts as the decommissioning work will take place on areas already modified site. It is not expected that the activities will result in negative impacts on any sensitive species. Based on the analysis provided above, the impact of vegetation removal, habitat fragmentation and degradation will be **negligible**.

Residual Impact

The impact significance is low after mitigation measures during construction and low post mitigation for operations. With the proposed mitigation measure the residual negative impacts on flora are assessed to be of a low magnitude.

Table 8-5: Residual Impact Significance on Flora

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Disturbance to vegetation and habitat loss	Construction	Low	Minor

8.3.3 Impacts on Fauna and Avifauna

The pipeline route on the ROW and is aligned to the Nairobi-Mombasa Highway and within the road reserve. The natural environment along the reserve has been largely transformed and modified with no natural fauna of any importance. The habitats within the site are primarily modified and are considered to have a low sensitivity.

Baseline Conditions

The natural environment has been largely transformed. The site is modified and has no natural vegetation of importance. The pipeline does not traverse any protected area, surface water body, creek or estuarine. However, in Kwale County, at the point where the transmission line starts (reservoir), about 5kms away, there is the Mwache Forest, a gazetted and protected habitat known to have species some categorized as CE (see section 5.6.2 and 5.10.7.1)

Impact Assessment

Construction Phase

During construction, fauna within the near surrounds of the development area will be disturbed due to noise, vibration, and human and vehicle presence. Disturbance impacts during construction are likely to be temporary and short lived. Based on the survey carried out for the ESIA, it is not expected that there will be any sensitive species in the Project area of international or local importance. As indicated in baseline conditions above, Mwache Forest which harbours sensitive species of avifauna is outside of the project area of influence and the construction activities are unlikely to affect these species directly or indirectly as interaction of workers with the forest is unlikely. The remaining sections of the transmission line in Kwale County, and in Mombasa County are predominantly urban and peri-urban area with primarily extensively modified habitats.

The habitat within the site is primarily modified and are considered to have a low sensitivity. The impact is direct and negative; resulting from the land take and disturbance during construction. The extent of the impact is presented is restricted to the site and therefore local in nature. The magnitude of the impact is considered to be low. Based on the analysis provided above, the impact of direct loss and degradation of habitat will be a **Minor** negative impact pre-mitigation.

Table 8-6: Construction Phase Impact Significance on Flora

Impact	Avifauna during Construction

Impact Nature	Negative	Positive	Neutral	
	Disturbance to fauna species and loss of habitat as a result of the degradation to environment during construction.			
Impact Type	Direct	Indirect	Induced	
	Impact is as a result of a direct interaction between the project (i.e. construction activities) and the fauna population in project site			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The effect is considered temporary as it will only occur during the construction period			
Impact Extent	Local	Regional	International	
	Impact is limited to AoI (local)			
Impact Scale	The impact is considered low scale and only in the project.			
Frequency	Once off			
Impact Magnitude	Negligible	Low	Moderate	High
Resource/ Receptor Sensitivity/Value/	Low	Medium	High	
	The sensitivity is considered low due to the disturbed and modified habitats in project site.			
Impact Significance	Negligible	Minor	Moderate	Major
	Considering the impact magnitude is medium and the sensitivity is low, the overall significance is considered to be of minor significance.			

Operation Phase

During the operational phase there is no significant impacts expected on fauna populations due to the limited activities mainly associated with maintenance of the pipeline with low potential to impact on fauna. The extent of the impact is restricted to the site and therefore local in nature. The magnitude of the impact is considered to be low. Based on the analysis provided above, the impact of direct loss and degradation of habitat will be of minor significance pre-mitigation.

Table 8-7: Operation Phase Impact Significance on Flora

Impact	**Fauna During Operations**			
Impact Nature	Negative	Positive	Neutral	
	No Impact			
Impact Type	Direct	Indirect	Neutral	
	No Impact			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The impact is considered temporary			
Impact Extent	Local	Regional	International	
	Impact is limited to the Project AoI (loca)			
Impact Scale	The impact is considered low in scale.			
Frequency	The frequency zero			
Impact Magnitude	Negligible	Moderate	Low	High
	No Impact			
Resource/ Receptor Sensitivity	Low	Medium	High	
	The sensitivity is considered low			
	Negligible	Minor	Moderate	Major

Impact Significance	Considering the magnitude of the impact is small and the sensitivity is low the overall significance is considered to be of minor significance

The following mitigation measures are recommended during operations:

- All areas disturbed by construction activities shall be landscaped and rehabilitated.

Decommissioning Impacts on Fauna

The impacts on fauna will be **minor** and temporary impacts as the decommissioning work will take place on areas already modified by the infrastructure. The modified areas have low sensitivity with no natural fauna of unique importance or conservational significance. The impact of direct loss of fauna and degradation of habitat will be **negligible.**

Residual Impact

The impact significance is **Negligible** after mitigation measures during construction and **Minor** post mitigation for operations. There will be some habitat loss as a result of the construction, however the habitat is modified and not expected to have conservational value.

Table 8-8: Residual Impact Significance on Flora

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Disturbance to fauna species and degradation to environment during construction and decommissioning	Construction/Decommissioning	Minor	Negligible

8.3.4 Impact on Air Quality

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.

1. CO – Carbon monoxide;
2. CO_2 - Carbon dioxide;
3. NO_X– Nitrogen oxides including NO_2 - nitrogen dioxide and NO – nitric oxide.
4. PM10 – fine particulate matter including soot/black; and
5. Sulphur dioxide (SO_2): SO_2 is of concern because of its impacts on health and vegetation.
6. Dust is defined as all particulate matter up to 75 μm in diameter and comprising both suspended and deposited dust, whereas PM10 is a mass fraction of airborne particles of diameter 10μm or less. Dust and PM_{10} emissions arise from a number

of sources, so both construction activities and emissions from vehicles associated with the construction site need to be considered.

It is not expected that significant impact will occur on local residents or that emissions will exceed regulatory permissible ground-level concentrations. All air emission impacts will be of temporary nature, location specific and reversible. The impact on air quality is considered to be insignificant if appropriate mitigation measures are implemented such as dust suppression techniques, regular maintenance of vehicles, use of high-quality fuel, etc. Further, the project will be implemented through the significant use of manual labour and mostly through manual equipment. This minimizes the air quality impacts from motorized machinery. Excavated spoil material will be minimal with the backfilling using the same spoil material undertaken whenever possible. Sources of air pollutants from the construction works will include traffic in and out of the site emitting and earth works at site during the excavation of trenches.

Impact Assessment

Exhaust Emissions

No detailed traffic data is available at this stage. However, the numbers of Heavy-Duty Vehicles (HDV) and Light Duty Vehicles (LDVs) are expected to be well below the thresholds for potentially significant impacts. On this basis, the magnitude of impacts associated road traffic exhaust emissions are predicted to be **Negligible**. Combined with the Medium and Low receptor sensitivities identified, the overall significance of impacts is Negligible.

Dust and PM10

There are the potential for impacts to arise from:

- Construction traffic on roads;
- Earthworks;
- Trackout[3]

The Project will require earthworks on the site. These works will include stripping vegetation on site, trench and manhole excavations etc. Due to the scale of these activities, the Magnitude is Negligible.

The exact number of HDVs that will be generated is unknown. However, this is expected to range from 2 to 5 HDVs per day category using site roads. On this basis, the magnitude of trackout is low. Combined with the Medium and Low receptor sensitivities identified the significance of unmitigated impacts are:

- Traffic on unpaved roads are **Minor** where there are receptors within 50m of unpaved roads used by construction traffic, or the haul route;
- Earthworks are **Moderate** where there are receptors within 350m of locations where earthworks are being undertaken, including stripping and excavations.
- Construction activities are **Negligible**; and

[3] Track-out or carry-out is dirt, mud or other debris tracked onto a paved road surface or area accessible to the public by a vehicle.

- Trackout are **Minor** at receptors within 50m of routes used to access the construction route where these are within 500m of the access point to the route or construction site.

On this basis there is a need for mitigation to be implemented to reduce dust emissions/impacts.

Table 8-9: Construction Phase Impact Significance on Air Quality

Impact	**Degradation of the Airshed during Construction**			
Impact Nature	Negative	Positive	Neutral	
	Increase in airborne pollution.			
Impact Type	Direct	Indirect	Induced	
	Impact is a result as a direct interaction between project activities and the environment along the footprint of the project.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The impact is expected to be temporary as emissions arise throughout the construction phase only.			
Impact Extent	Local	Regional	International	
	The impact will arise locally in the footprint of the project and immediate surrounds. Impacts will also arise further afield close to unpaved public roads used to access the work sites during construction.			
Impact Scale	The impact is considered as small (local) scale.			
Frequency	Intermittent impacts will typically only arise during working hours.			
Likelihood	Inevitable			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the above the impact magnitude is considered small.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	The sensitivity of human receptors is Low. The receptors of agricultural activities is Low and considering that the pipeline is aligned to an international trunk road (Nairobi-Mombasa) highway, the project induced emission will be low			
Impact Significance	Negligible	Minor	Moderate	Major
	Dust emissions have the potentially to have minor significant impacts at nearby sensitive human receptors.			

Mitigation Measures

Mitigation measures are split into general considerations for all construction activities, and specific mitigation measures for traffic on unpaved roads, earthworks and track-out. As general measures for all locations:

- Develop a Dust Management Plan;
- Record all dust and air quality complaints, identify cause(s), take appropriate measures;
- Undertake monitoring close to dusty activities, noting that this may be daily visual inspections, or passive/active monitoring
- 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
- 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;
- Impose speed limits on haul routes and in construction compound to reduce dust generation;
- Minimise 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 shall be set out in the **Dust Management Plan** and shall consider water availability and any stakeholder grievances; and

For earthworks:

- Revegetate exposed areas as soon as feasible
- Cover stockpiles if feasible;
- Expose the minimum area required for the works and undertake; and exposure on a staged basis to minimise dust blow.

For trackout:

- Where trackout is onto paved roads, use wet road cleaning methods to remove dirt and mud build up;
- Avoid dry sweeping of large areas; and
- Where feasible, undertake wheel washing and vehicle clean down prior to accessing public roads.

Operation Air Pollution Impacts

Air pollution during operation will include dust and particulate emissions that will be generated from the operationa phase activities, include movement of vehicles along the route during maintenance. The pollutants include Carbon Dioxide (CO_2), Volatile Organic Compounds (VOC), carbon monoxide (CO), Nitrogen Oxides (NO_2) and particulate matter (PM). The significance of the impacts on air quality from the operation activities is considered minor. The numbers of maintenance vehicles are expected to be well below the thresholds for any significant impact associated with traffic exhaust emissions. The impact on air quality is predicted to be negligible.

Table 8-10: Construction Phase Impact Significance on Air Quality

Impact	**Degradation of the Airshed during Construction**			
Impact Nature	Negative	Positive	Neutral	
	Increase in airborne pollution.			
Impact Type	Direct	Indirect	Induced	
	Impact is a result as a direct interaction between project activities and the environment along the footprint of the project.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The impact is expected to be temporary as emissions arise throughout the construction phase only.			
	Local	Regional	International	

Impact Extent	The impact will arise locally in the footprint of the project and immediate surrounds. Impacts will also arise further afield close to unpaved public roads used to access the work sites during construction.			
Impact Scale	The impact is considered as small (local) scale.			
Frequency	Intermittent impacts will typically only arise during working hours.			
Likelihood	Inevitable			
Impact Magnitude	Negligible	Moderate	Low	High
	Based on the above the impact magnitude is considered small.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	The sensitivity of human receptors is Low. The receptors of agricultural activities is Low and considering that the pipeline is aligned to an international trunk road (Nairobi-Mombasa) highway, the project induced emission will be low			
Impact Significance	Negligible	Minor	Moderate	Major
	Dust emissions have the potentially to have minor significant impacts at nearby sensitive human receptors.			

Mitigation Measures

Mitigation measures are split into general considerations for all operation activities, and specific mitigation measures for traffic on unpaved roads, earthworks and track-out. As general measures for all locations:

- Develop a Dust Management Plan;
- Record all dust and air quality complaints, identify cause(s), take appropriate measures;
- Undertake monitoring close to dusty activities, noting that this may be daily visual inspections, or passive/active monitoring
- 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
- 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;
- Impose speed limits on haul routes and in construction compound to reduce dust generation;
- Minimise 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 shall be set out in the **Dust Management Plan** and shall consider water availability and any stakeholder grievances; and

For earthworks:

- Revegetate exposed areas as soon as feasible
- Cover stockpiles if feasible;
- Expose the minimum area required for the works and undertake; and exposure on a staged basis to minimise dust blow.

For trackout:

- Where trackout is onto paved roads, use wet road cleaning methods to remove dirt and mud build up;
- Avoid dry sweeping of large areas; and
- Where feasible, undertake wheel washing and vehicle clean down prior to accessing public roads.

Decommissioning Air Pollution Impacts

Air pollution during decommissioning include gaseous and dust emissions from temporary equipment and vehicles involved in dismantling of the structures e.g., staff houses, guard houses, reservoirs and pipelines (excavation and backfilling). The pollutants include Carbon Dioxide (CO_2), Volatile Organic Compounds (VOC), carbon monoxide (CO), Nitrogen Oxides (NO_2) and particulate matter (PM). Excavation, earth moving, loading, handling and transportation of materials will also give rise to fugitive dust. The significance of the impacts on air quality from the decommissioning activities is considered minor. The numbers of vehicles and mobile equipment are expected to be well below the thresholds for any significant impact associated with traffic exhaust emissions. The traffic management plan developed during construction shall be used during this phase. The impact on air quality is predicted to be negligible.

Residual Impact

The residual impacts associated with road traffic exhaust emissions are **Negligible**. With the implementation of suitable mitigation and with adequate monitoring, residual impacts associated with dust and PM10 from construction activities are **Negligible**.

Table 8-11: Residual Impact Significance on Air Quality

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Road Traffic Exhaust Emissions	Construction	Negligible	Negligible
Dust and PM10 from construction activities.	Construction	Negligible	Negligible

8.3.5 Impact on Soil and Geology

The construction works are not anticipated to significantly impact on soil and geology of the project site other than disturbances to soil which could subsequently result in erosion and soil contamination by oil leaks from excavation and construction equipment. The works on construction including removal of topsoil and digging, as well as presence of machinery and workers at site will have minor negative impact on soil quality. The identified impacts are the following:

- Mechanical impact on soil during construction process (trenching and backfilling);
- Stimulation of water and wind erosion;
- Soil pollution by spilling or discharge of oil and oil derivate, motor oil, and similar wastes originating from machinery and vehicles on site;
- Soil pollution due to uncontrolled deposition of solid waste (spoil material) on the

land;
- Soil pollution due to uncontrolled discharge from on-site toilets for workers on the land;

The project route hasseveral sections with a gentle sloping structure. Due to this, construction can have potential to cause soil erosion and sediment run-off. Soils in the area are sandy and which are known to be particularly prone to erosion. However, the pipeline does not cross any surface water bodies which would be impacted by erosion from the construction works.

Significance of Impact

The impact on soil and geology is regarded as low even without mitigation and limited within the project footprint. The excavated soil (spoil) will be used as backfill thereby reducing potential run off associated with spoil wastes. The use of motorized equipment likely to lead to soil contamination from oil leaks is also expected to be minimal as a result of little use of motorized equipment during construction. Impact is short term and is a direct negative impact. The overall magnitude is considered to be low.

Table 8-12: Construction Impact Significance on Soils and Geology

Impact	**Geology and Soil Erosion During Construction**			
Impact Nature	Negative	Positive	Neutral	
	Loss of soil cohesion contributing to erosion.			
Impact Type	Direct	Indirect	Induced	
	Impact is a result as a direct interaction between project activities and soil along the footprint of the project.			
Impact Duration	Temporary	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 Extent	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	Negligible	Low	Moderate	High
	Based on the above the impact magnitude is considered small.			
Resource/Receptor Sensitivity	Low	Medium	High	
	The sensitivity of the soil on the site to erosion is considered to be medium to high.			
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 shall be implemented to minimize the potential for soil erosion:

- Plain surface grassing
- Grasscrete lining

- Mass concrete erosion checks, with different combinations for different slopes.
- Gabion protection works for slope structural protection
- Vegetation clearing and topsoil disturbance shall be minimized.
- Sheet erosion of soil shall be prevented where necessary through the use of sandbags, 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 shall take place during the dry season.
- Topsoil shall be reinstated only in areas located outside the RoW.
- Accelerated erosion from storm events during construction shall be minimised 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.
- Reinstate any roadside drainages and erosion control structures disturbed by construction works immedietly to appropriate standards.
- Ensure vehicles are properly maintained to minimise potetial for oil spills through leakages.
- Spill kits in motorised vehilces for use from accidental oil spills

Operation Phase

The operation phase activities are not anticipated to significantly impact on soil and geology of the project site other than disturbances to soil occurring from any pipeline maintenance works requiring excavations, trenching etc, which could subsequently result in erosion and soil contamination by oil leaks from excavation and construction equipment.

Significance of Impact

The impact on soil and geology is regarded as low even without mitigation and limited within the project footprint. The excavated soil (spoil) will be used as backfill thereby reducing potential run off associated with spoil wastes. The use of motorized equipment likely to lead to soil contamination from oil leaks is also expected to be minimal as a result of little use of motorized equipment during operation. Impact is short term and is a direct negative impact. The overall magnitude is considered to be low.

Table 8-13: Operation Impact Significance on Soils and Geology

Impact	**Geology an dSoil Erosion During Operation**			
Impact Nature	Negative	Positive	Neutral	
	Loss of soil cohesion contributing to erosion.			
Impact Type	Direct	Indirect	Induced	
	Impact is a result as a direct interaction between project activities and soil along the footprint of the project.			
Impact Duration	Temporary	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 Extent	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	Negligible	Low	Moderate	High
	Based on the above the impact magnitude is considered small.			
Resource/Receptor Sensitivity	Low	Medium	High	
	The sensitivity of the soil on the site to erosion is considered to be medium to high.			
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.			

Decommissioning Soil Erosion and Contamination Impacts

Decommissioning activities will have direct physical impacts to soil including erosion resulting from excavation to remove the ancilliary strutures, pipelines etc. This will disrupt the soil cohesion and also will result in surplus soil extracted. The removed soil will be backfilled into the excavations in the order of removal to preserve the soil profile. Given the sub tropical location of the Project and the nature of vegetation present, it is anticipated that cleared areas will revegetate naturally and relatively quickly. There is also the potential for spills (e.g., of fuels and oils from fueling, maintenance of machinery and vehicles), these have the potential to affect terrestrial environments and could lead to the deterioration of soil, water and sediment quality, the extent of this will be limited to the project site. The overall magnitude is considered to be **minor**. The mitigation measures employed during construction, will be used to mitigate this impact.

Residual Impact

The implementation of the proposed mitigation measures reduces the significance of the residual impact to negligible to minor on the project site.

Table 8-14: Residual Impact Significance on Soils and Geology

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Loss of soil resources due to erosion	Construction/Operation /Decommissioning	Negligible-Minor	Negligible to minor
Contamination from oil spills	Construction/Operation /Decommissioning	Negligible-Minor	Negligible to minor

8.3.6 Noise and Vibration Emission Impacts

Potential noise impacts may arise as a result of the construction activities. There will be risks and impact of noise and vibration resulting from the construction equipment and machinery on people. Potential sources of noise and vibration during construction will include clearing and grubbing, trench and manhole chambers' excavations, earthmoving, construction traffic etc. 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. Blasting as a construction activity will not occur. The equipment used in construction will generate minimum noise during construction of and will not adversely affect communities and fauna.

The ambient noise environment in the project route area is influenced by activities within the Nairobi-Mombasa highway and are mainly, vehicular movement/taffic, and trading activities. The noise baseline survey conducted for the ESIA determined that daytime noise levels, LAeq, were generally low and in the range 35 to 41 dB. Noise monitoring was not carried out during the night as significant night-time noise effects from the construction and operation of the Project are not expected.

A sound power level of 105 dB (A) has been assumed for the noisiest phase of construction, which is expected to be excavation, tenching and backfilling works, foundation works for outfalls and the reservoir among others. This includes trucks, hydraulic crane truck, generator, drilling machine, concrete mixer, dump trucks, pressure testing equipment, dewatering pumps.

Impact Assessment

Construction Phase

There will be noise and vibrations generated during the construction phase, but it will be typical of any construction site. The noise impact during construction is expected to be negative and short-term. The major receptors are expected to be the construction workers as well as any immediate neighbouring residential premises. Sources of noise will be trucks and the off-road vehicles in transit, use of compressor to break hard ground. Impacts of noise include noise-induced hearing loss for the workers and nuisance for the affected residential areas. The sensitive receptors close to the project site are outlined in section 5.5.4.1 and 5.8.4.

Table 8-15: Construction Impact Significance on Noise and Vibration

Impact	**Noise during Construction**			
Impact Nature	Negative	Positive	Neutral	
	Elevated noise levels from operation of construction and decommissioning equipment.			
Impact Type	Direct	Indirect	Induced	
	Impact is a result of noise generated by construction and decomissioning activities.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	Impacts are expected to be short term (during the construction and decommissioning phase) at any individual NSR			
Impact Extent	Local	Regional	International	
	The impact will be limited to the NSRs within the immediate surrounds of each worksite.			
Impact Scale	Local			
Frequency	Impacts may occur during daytime periods over a short-term duration at each worksite.			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the above the impact magnitude is considered negligible to small.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	Dwellings are considered to have a high sensitivity to noise.			
Impact Significance	Negligible	Minor	Moderate	Major
	Considering the impact magnitude is small to negligible and the sensitivity is low, the overall significance is considered to be negligible to minor.			

Operation Phase

During the operational phase, noise impacts is expected to be minimal and emanating from pipeline maintenance activities with the major receptors the same as described above.

Mitigation

Mitigation measures are set out below, which have been assumed for the base case assessment. They are assumed to result in a 5 dB (A) reduction in the overall noise from construction plant teams. The following standard mitigation measures shall be employed:

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

Table 8-16: Operation Impact Significance on Noise and Vibration

Impact	**Noise during Operation**			
Impact Nature	Negative	Positive	Neutral	
	Elevated noise levels from operation of equipment.			
Impact Type	Direct	Indirect	Induced	
	Impact is a result of noise generated by construction and decomissioning activities.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	Impacts are expected to be short term (during the construction and decommissioning phase) at any individual NSR			
Impact Extent	Local	Regional	International	
	The impact will be limited to the NSRs within the immediate surrounds of each worksite.			
Impact Scale	Local			
Frequency	Impacts may occur during daytime periods over a short-term duration at each worksite.			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the above the impact magnitude is considered negligible to small.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	Dwellings are considered to have a high sensitivity to noise.			

Impact Significance	Negligible	Minor	Moderate	Major
	Considering the impact magnitude is small to negligible and the sensitivity is low, the overall significance is considered to be negligible to minor.			

Decommissioning Noise Emission and Vibration Impacts

Potential sources of noise and vibration include excavations, dismantling of structures (reservoirs) earth moving equipment and traffic. The equipment generates noise levels below values that will adversely affect communities and fauna. To further minimize exposure to noise, work will be carried out during the day only. The significance of the noise impacts during decommissioning has been rated as negligible.

Residual Impact

Standard mitigation measures listed above have been assumed for the base case noise assessment. No impacts above small are predicted and therefore no further mitigation is required. Consequently, the residual impacts are the same as those presented above.

Table 8-17: Residual Impact Significance on Noise and Vibration

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Noise from construction activities affecting nearby dwellings	Construction/Operation/Decommissioning	Negligible-Minor	Negligible

8.3.7 Solid and Liquid Waste Generation

Improper waste management procedures or lack of mitigation measures during construction, phase of the Project may result in adverse environmental and social impacts on: -

- Storm water quality and thus water quality in the water bodies in project area;
- Surface water quality;
- Ground water quality;
- Soil quality;
- Ecological receptors or human health.

The different types of wastes and sources that are likely to be generated from the construction are described below.

a) Recyclable and Reusable Waste

The types of recyclable and reusable wastes to be generated on site during the construction period include among others: -

Box 8-1: Recyclable and reusable waste

1. Waste metal
2. Waste plastic
3. Waste glass
4. Wastepaper (packaging material)
5. Clean containers, drums, bins etc.

b) Excavation Waste

The greatest volume of excavated material will arise from the construction activities of the Project during civil works associated with construction. The excavated materials will be re-used immediately as back fill material.

c) Wastewater

Water will be required for the mixing of concrete during construction, washing of construction equipment, flushing valves during operation phase, domestic waste water used by workers (mobile toilets) etc These activities will lead to the generation of waste water.

d) Hazardous Waste

The construction activities will generate hazardous wastes which may adversely impact on the local environment due to handling, storage, transport and disposal. These include, oil, grease etc. During the construction period, waste oil will result from the maintenance of machines, equipment and construction vehicles.

Impact Assessment

Direct and indirect disposal of waste oils to the receiving environment is likely to adversely impact on the environment and human health. Without mitigation measures, it is anticipated that there will be potential moderate to minor adverse impacts during construction and moderate adverse impacts during the operations periods. Wastewater if discharged indiscriminately into the environment, will lead to risks and impacts on water bodies, soil, vegetation, fisheries, and human health.

Table 8-18: Construction Impact Significance on Solid and Liquid Waste

Impact	**Waste generation and hazards during Construction**			
Impact Nature	Negative	Positive	Neutral	
	Disposal of waste to the receiving environment is likely to adversely impact on the environment and human health.			
Impact Type	Direct	Indirect	Induced	
	Waste generated from the used materials during construction and operation activities that could cause land and groundwater contamination if spilled or not handled, stored and disposed of correctly.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The impact is considered to be temporary for the duration of the construction phase.			
Impact Extent	Local	Regional	International	
	Impact limited to the Study Area (local)			
Impact Scale	The impact is considered as small scale since it is local to the construction area.			
Frequency	The frequency is considered to be occasional considering that the construction activities are localized.			
	Negligible	Low	Moderate	High

Impact Magnitude	Based on the parameters above and considering the embedded measures, the magnitude is considered to be small.			
Resource/Receptor Sensitivity	Low	Medium	High	
	The sensitivity of the of the potential receptors- land and ground water is High			
Impact Significance	Negligible	Minor	Moderate	Major
	Considering the magnitude is small and sensitivity is moderate, the impact on the land and water resources during construction is considered to be of **moderate** significance.			

Mitigation

The following mitigation measures shall be employed to reduce any impacts on associated with waste generation.

- A Waste Management Plan must be prepared prior to commencement of construction by the contractor which shall contain:
    - An inventory of the types and quantities of waste to be produced.
    - The most appropriate waste management approach for each type of waste including details on (temporary) storage, transport and final destination of the waste.
    - An assessment of any opportunities for reducing solid waste generation, in particular of hazardous and undesirable (persistent and non-reusable) types of wastes.
- The Contractor to maintain records of types, quantities, origin, (temporary) storage, transport and elimination/reuse of solid waste, and make these available to the works supervisor upon his request, as proof of proper waste management practices.
- Any waste including excess soil shall be disposed of at NEMA gazette sites.
- Excavated soils shall be reused as much as possible as filling material and shall be contained after excavation.
- Provisional material storage on site shall be designed and undertaken in such a way as to ensure that soils and underground water are not polluted.
- Use licensed recycling companies to externally recycle, recover or dispose of waste.
- Construct storm water drainages in sections with wash out valves or ensure wash out valves channel flush water into existing storm water drainage systems.
- Construct storm water cut-off drains and scour/overflow drains provided at the reservoir sites to prevent erosion of embankments and/ or to prevent storm water from flooding the site and compromising the infrastructure.
- Storm water drains to either be unlined earth drains or Inverted Block Drains, depending on their location with respect to buildings, structures and roads.
- Unlined earth drains shall be grassed to avoid scouring.
- At road crossings, open drains to be provided with precast concrete culverts of varying sizes.
- HDPE DWC drainage pipes and precast concrete chambers to be provided for overflow and scour drainage system from the proposed storage reservoirs.

Operation Solid and Liquid Waste Impacts (including domestic waste water from beneficiaries)

Solid and liquid wastes generated during this project phase will be associated with operation and maintenance works during washouts (washout valves) and any debris or litter

(packaging materials) use by maintenance workers as well as sewerage wastes (from workers on reservoir site), waste effluent from cleaning/washing among others. The sewerage wastes shall be chanelled into the soak pits that shall be constructed for management of sanitary wastes. There is also expected to be an increased in sewerage waste from households that will benefit from the increased water supply during use. Solid wastes including site kitchen and office wastes shall be disposed by a NEMA registered waste agent. To mitigate any residual impact, the waste management plan used during construction will be implemented.

Table 8-19: Operation Impact Significance on Solid and Liquid Waste

Impact	**Waste generation and hazards during operation**			
Impact Nature	Negative	Positive	Neutral	
	Disposal of waste to the receiving environment is likely to adversely impact on the environment and human health.			
Impact Type	Direct	Indirect	Induced	
	Waste generated from the used materials during construction and operation activities that could cause land and groundwater contamination if spilled or not handled, stored and disposed of correctly.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The impact is considered to be temporary for the duration of the operation phase.			
Impact Extent	Local	Regional	International	
	Impact limited to the Study Area (local)			
Impact Scale	The impact is considered as small scale since it is local to the construction area.			
Frequency	The frequency is considered to be occasional considering that the construction activities are localized.			
	Negligible	Low	Moderate	High
Impact Magnitude	Based on the parameters above and considering the embedded measures, the magnitude is considered to be small.			
Resource/Receptor Sensitivity	Low	Medium	High	
	The sensitivity of the of the potential receptors- land and ground water is High			
Impact Significance	Negligible	Minor	Moderate	Major
	Considering the magnitude is small and sensitivity is moderate, the impact on the land and water resources during construction is considered to be of **moderate** significance.			

Mitigation

The following mitigation measures shall be employed to reduce any impacts on associated with waste generation.

- A Waste Management Plan must be prepared for operation phase which shall contain:
    - An inventory of the types and quantities of waste to be produced.
    - The most appropriate waste management approach for each type of waste including details on (temporary) storage, transport and final destination of the waste.
    - An assessment of any opportunities for reducing solid waste generation, in particular of hazardous and undesirable (persistent and non-reusable) types of wastes.
- The project to maintain records of types, quantities, origin, (temporary) storage,

transport and elimination/reuse of solid waste, and make these available to the works supervisor upon his request, as proof of proper waste management practices.

- Excavated soils shall be reused as much as possible as filling material and shall be contained after excavation.
- Use licensed recycling companies to externally recycle, recover or dispose of waste.
- Construct storm water drainages in sections with wash out valves or ensure wash out valves chanell flush water into existing storm water drainage systems.
- Construct storm water cut-off drains and scour/overflow drains have been provided at the reservoir sites to prevent erosion of embankments and/or to prevent storm water from flooding the site and compromising the infrastructure.
- Storm water drains to either be unlined earth drains or inverted block drains, depending on their location with respect to buildings, structures and roads.
- Unlined earth drains shall be grassed to avoid scouring.
- At road crossings, open drains to be provided with precast concrete culverts of varying sizes.
- HDPE DWC drainage pipes and precast concrete chambers to be provided for overflow and scour drainage system from the proposed storage reservoirs.
- Undertake awareness and senistisation of the beneficiaries on water conservation to avoid mis-use leading to increased effluent.

Decommissioning Solid and Liquid Waste Impacts

Solid and liquid waste will be generated during this phase of the project and include plastic, cables, metal, wood, glass, wastewater etc. excavated materials shall be re-used immediately as back fill material. To mitigate any residual impact, the waste management plan used during construction shall be implemented.

Residual Impact

The impact significance is **Negligible** after mitigation measures during construction and **Minor** post mitigation for operations.

Table 8-20: Residual Impact Significance on solid and liquid waste

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Poor waste disposal	Construction	Minor	Negligible
Poor waste disposal	Operation	Minor	Minor

8.3.8 Landscape and Visual Impacts

Visual Impacts refers mainly to the changes to the visual character of landscape views resulting from: obstruction of existing views; removal of screening elements thereby exposing viewers to unsightly views; the introduction of new elements into the views of the visual receptors and intrusion of foreign elements into the view shed of landscape features. The construction activities will have an impact on the visual character of the landscape due to:

- Clearance of vegetation on site

- Presence of construction vehicles and equipment
- Worker presence and activity
- Open trenches and mounds of excavated materials; and
- Dust emissions resulting from construction activities and traffic

Impact Assessment

Construction Phase

As per the current settings of the project area, the proposed project will cause minimal change to people's existing views. Despite the direct and negative impact of additional construction vehicles on site, it will be temporary and local. The small magnitude on visual amenity and the low sensitivity of the receptors means the significance of this impact is assessed as negligible. Based on the analysis provided above, the visual impact and change of landscape will be of minor significance.

Table 8-21: Construction Impact Significance on Landscape and Visual

Impact	**Visual Amenity during Construction**			
Impact Nature	Negative	Positive	Neutral	
	Change in visual amenity			
Impact Type	Direct	Indirect	Induced	
	Impact is a result as a direct interaction between project activities and local views			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The impact duration will be temporary			
Impact Extent	Local	Regional	International	
	The impact will be limited to the immediate surroundings of the construction site.			
Impact Scale	The impact is considered as small (local) scale.			
Frequency	Continuous			
Likelihood	Possible			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the above the impact magnitude is considered small.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	The area has mainly modified environment with no relevant scenic views'/locations			
Impact Significance	Negligible	Minor	Moderate	Major
	Considering the impact magnitude is small and the sensitivity is low, the overall significance is considered to be Negligible.			

Operation Phase

Based on the analysis provided above, the visual impact and change of landscape will be of ***minor*** significance originating mainly from the reservoirs, guard and staff houses and above ground covers/inspection chambers, drainage outfalls and washout/airvalves.

Table 8-22: Operation Impact Significance on Landscape and Visual

Impact	**Visual Amenity during Operations**		
Impact Nature	Negative	Positive	Neutral
	Change in visual character		
Impact Type	Direct	Indirect	Induced
	Impact is as a result of a direct interaction between the project and surrounding residents and land users		

Impact Duration	Temporary	Short Term	Long Term	Permanent
	The impact duration will be permanent throughout the project life.			
Impact Extent	Local	Regional	International	
	The view shed experience is limited to few kilometres			
Impact Scale	The impact is considered as local scale.			
Frequency	Likely			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the above the impact magnitude is expected to be medium			
Resource/ Receptor Sensitivity	Low	Medium	High	
	The area has mainly modified environment with no relevant scenic views' locations			
Impact Significance	Negligible	Minor	Moderate	Major
	Considering the magnitude is medium and the sensitivity is low the overall significance is considered to be minor			

Mitigation

Specific recommended measures as best practices include:

- Any excavated or cut and fill areas shall be landscaped and revegetated
- No debris or waste materials shall be left at the work sites, good housekeeping on site to avoid litter and minimise waste
- Night lighting of sites shall be minimized within requirements of safety and efficiency
- Ongoing rehabilitation of cleared areas to minimise visual scarring and maintenance clearing shall be kept to the absolute minimum and shall not extend beyond the project site

Residual Impact

Considering the nature of the construction activities, the foreseen mitigation measures are able to further reduce the impacts avoiding an alteration of the view shed experience. For the operational phase, the nature of the project features is limiting the possibility to greatly reduce the potential impacts.

Table 8-23: Residual Impact Significance on Landscape and Visual

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Visual impact	Construction	Minor	Negligible
Visual impact	Operation	Minor	Negligible

8.3.9 Impacts on Surface Water

Construction activities can have significant effects on the surface water resources within the AoI and good environmental management, including control of runoff, sediments, storage of fuels and good practice shall be followed. Project activities will interact with water resources in the following ways:

- There will be direct interaction during clearing and construction near to or in surface water bodies.
- There will be indirect interaction in the case of erosion of soils into water bodies.

- In addition, if vegetation and soil clearing are not properly managed, there is the potential for soils to run into water bodies and increased sediment load. This in turn may have a detrimental effect on water quality and affect surface water users.

During the construction, water will be required for construction process, cleaning of the vehicles and equipment, keeping down construction dust impacts among others.The potential impacts and risk of the project relating to surface water supply are:

- Stresses on local water resources from construction water abstractions from surface and/or ground water; and
- Potential indirect effects from water demand caused by local population expansion due to in-migration.
- Overall raw water supply requirements for the construction of will be very low and necessary during concrete mixing only and keeping down the dust.

In the project area the only surface water body is Mwache River which is approximately 6 kms to the south of the site. Therefore, there will be very low impact if any on the Mwache River as a surface water with no discharge or effluent expected. **Chapter 3** shows the national waste water and effluent discharge standards.

Construction Phase

Below are risks and impacts on surface water that are likely to be encountered as a result of the project during the construction phase:

1. The construction of the project may cause temporary disturbances and negative effects on surface water resources.
2. Stockpile and other materials may enter any other surface water resources near to the Project site where there are inadequate containment measures. Such surface runoff may carry sediments or harmful wastes, and these may collect in rivers or any other surface water resources and therefore there will be negative impacts on water quality.
3. In the project site there may be storage areas for chemicals, fuels, oils, etc., used for construction activities including refueling of vehicles. These materials must be stored according to the regulatory requirements, including the related regulation. Otherwise, there may be risk of leakage of all chemicals to the surface water resources, and so there may be impact on water quality.
4. In addition, all chemicals, fuels, oils etc. used for construction activities must be handled, transported, and used according to related regulation and procedures. Otherwise, there may be risk of spill of these by accidents etc. Therefore, there may be impact on water quality.
5. There may also be risks of pollution from the uncontrolled runoff or accidental spillage of fuels and lubricants, or from the inadequate or unsafe disposal of wastewater from construction site.
6. Land cleared during the construction will have a direct negative effect on surface water quality by increasing the turbidity and concentration of total dissolved/ suspended solids, with potentially adverse effects on river biota.

Under river crossings shall be provided at river channels, streams and gullies provided that:

- Construction will be possible without major difficulties
- Construction will not lead to serious environmental impacts of upstream and downstream environment
- The soil structure is not susceptible to movements due to ground water and will not lead to flotation of pipeline
- The water flow velocity on the river channel is not high
- The pipeline will be accessible for maintenance purposes i.e. draining of washouts
- The pipeline in under river crossings will be surrounded with mass concrete and protected with approved granular fill material and gabion mattress. The channel sides will be protected by gabions.
- Additional erosion control measures and drainage channels will also be provided on the valleys to ensure that the pipeline is not exposed.

The volume of soil likely to be disturbed by proposed project activities is likely to be ***minor*** and therefore the extent of the impacts from sediment addition to the nearby Mwache river or small stream adjacent to the road side dumpsite at Miritini at Ch. 3+880 is considered to be local. Owing to the subtropical location of the project and the high probability that cleared areas will revegetate naturally thereby limiting erosion, the duration of this impact is anticipated to be short term.

The nature of the construction activities renders the erosion of soil and subsequent siltation on the seasonal river possible. The ***small*** magnitude of this impact on surface water quality and the *low* sensitivity of the river to increased turbidity means the significance of this impact is assessed as ***minor***.

Table 8-24: Construction Impact Significance on Surface Water

Impact	**Siltation of surface water**			
Impact Nature	Negative	Positive	Neutral	
	Eroded soil entering surface water bodies.			
Impact Type	Direct	Indirect	Induced	
	Impact is a result as a direct interaction between project activities and the environment along the footprint of the project.			
Impact Duration	Temporary	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 project 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.			
Frequency	Intermittent			
Likelihood	Possible			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the above the impact magnitude is considered small.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	The sensitivity of the Mwache river close to the site to siltation is considered to be medium to low.			
	Negligible	Minor	Moderate	Major

Impact Significance	Considering the impact magnitude is small and the sensitivity is medium to low, the overall significance is considered to be minor.

Mitigation Measures

- Construct storm water cut-off drains and scour/overflow drains have been provided at the reservoir sites to prevent erosion of embankments and/ or to prevent storm water from flooding the site and compromising the infrastructure.
- Storm water drains to either be unlined earth drains or Inverted Block Drains, depending on their location with respect to buildings, structures and roads.
- Unlined earth drains shall be grassed to avoid scouring.
- At road crossings, open drains to be provided with Precast Concrete Culverts of varying sizes.
- HDPE DWC drainage Pipes and precast concrete chambers to be provided for overflow and scour drainage system from the proposed storage reservoirs.

Operation Phase Impacts

Once constructed, no direct disturbance of surface water bodies is anticipated due to the absence of surface water bodies along or traversed by the pipeline route other than waste water from wash out valves. Operation activities that could lead to surface water impacts include releases of waste waste from washout valves during the maintenance operations that could drain into existing surface water bodies.

Table 8-25: Operation Impact Significance on Surface Water

Impact	**Siltation of surface water**			
Impact Nature	Negative	Positive	Neutral	
	Eroded soil entering surface water bodies.			
Impact Type	Direct	Indirect	Induced	
	Impact is a result as a direct interaction between project activities and the environment along the footprint of the project.			
Impact Duration	Temporary	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 project 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.			
Frequency	Intermittent			
Likelihood	Possible			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the above the impact magnitude is considered small.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	The sensitivity of the Mwache river close to the site to siltation 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 mitigation measures listed for soil management above are also applicable to surface water quality. In addition, the following mitigation measures shall be implemented to minimise the potential for siltation of surface water:

- All wastewater which may be contaminated with oily substances must be managed in accordance with an appropriate waste management plan and no hydrocarbon-contaminated water may be discharged to the environment; and
- Maintain the storm water cut-off drains and scour/overflow drains have been provided at the reservoir sites to prevent erosion of embankments and/ or to prevent storm water from flooding the site and compromising the infrastructure.

Decommissioning Surface Water Quality Impacts

Decommissioning activities could have significant effects on the surface water resources along the project route. The impact will be limited to the footprint of the project and immediate surrounds. Good environmental management, including control of runoff, sediments shall be followed. The volume of soil to be disturbed by proposed project activities is projected to be **minor** and extent of the impacts from sediment addition to water bodies is considered to be local. The mitigation measures employed during construction, shall be used to mitigate this impact.

Residual Impact

The implementation of the proposed mitigation measures reduces the significance of the residual impact to ***negligible*** to ***minor***.

Table 8-26: Residual Impact Significance on Surface Water

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Quality of water/Pollution of surface water bodies	Construction/Operation/Decommissioning	Minor	Negligible to minor

8.3.10 Occupational Health and Safety Hazards

The construction is likely to attract workers from within the project area and outside of the project area. The total number of work force cannot be estimated at this point and will be provided by the contractor. The total work force is going to be skilled and unskilled and sourced from project locality and outside of locality including internationally depending on the skill sets desired. The workers required by the contractor may include among others:

i) Engineers-Skilled Experts (civil, mechanical) etc.
ii) Supervisors, Inspectors Foreman and Operators –Skilled Experts;
iii) Technicians (inspectorate, welders, masons, steel fixers, drivers etc.)- –Skilled Experts; and
iv) Unskilled-flagmen, diggers, cleaning, security, mixing, watering, help team.

The construction activities shall also entail engagement of a contractor. Workers' rights including occupational health and safety may be abused hence adverse impact and may

include exposure to accidents and injuries, loss of man-hours, labour abuses and to ensure fair treatment, remuneration and working conditions. These issues shall be considered not only for those who are directly employed by the proponent but also its contractors (including sub-contractors) and within the supply chain. The Project could potentially lead to work force-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. The potential for occupational health and safety incidents throughout the life cycle of the project is higher during construction phase.

Table 8-26 presents the potentially significant impacts associated with occupational health and safety and worker management during the construction and operation phases. The potential for occupational health and safety incidents throughout the life cycle of the project is higher during construction phase.

Table 8-27: Potential Impacts on Occupational Health and Safety and Worker Management

Construction Phase	Operation Phase
Impacts on workers' health and safety, in particular from road accidents, slip, and trip and falls hazards, burial by collapsing trenches, suffocating in deep inspections chambers, exposure to excessive noise and vibration during construction. Impacts on workers' rights from violations of labour laws in particular with respect to enforcement of health and safety measures by the employer such as the use of appropriate PPEs during construction. Workers are likely to be exposed to work related risks during the construction phase of the project. Typical activities include clearance of vegetated areas, excavation work, working at height. The above activities could expose workers to injuries and even fatalities when for instance those working at height fall, ladders collapse, objects fall on workers, electrocution etc. Similarly, the storage and disposal of hazardous waste and materials generated during the construction may also pose a hazard to the health of the workforce if not handled properly.	Impacts on worker's rights from lack of enforcement of health and safety measures by the employer such as the use of appropriate PPEs during operation. e.g when undertaking works in deep inspection chambers or manholes.

Relevant baseline conditions that may potentially influence impacts are summarized as follows:

1. There is adequate public health coverage in the County and the majority of the population have access to County/GoK subsidized health services.
2. Settlement level key informants reported that the distance to health centres from these settlements varies between 0 and 2 km.
3. Enforcement of health and safety laws and standards in Kenya is expected to be weak, which contributes to high incidence of accidents on construction sites

Table 8-28: Construction Impact Significance on Workers Health and Safety

Impact	Workers Health and Safety and Rights during Construction		
Impact Nature	Negative	Positive	Neutral

	Poor planning, non-compliance with health and safety best practice and labour rights can result in injuries or fatalities.			
Impact Type	Direct	Indirect	Induced	
	Resulting from a direct interaction between the Project (i.e., increased project traffic, open excavations,) and the workforce.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	Injuries and fatalities could have permanent impacts on workers and their families.			
Impact Extent	Local	Regional	International	
	The workforce will be primarily contracted from project area and neigbhouring Counties.			
Impact Scale	The impact scale is therefore medium.			
Frequency	The frequency is considered to be infrequent as the workforce and drivers are expected to be trained and the employer is expected to enforce the use of PPEs and health and safety measures.			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the parameters above and considering the embedded measures in place the magnitude is considered to be medium.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	The sensitivity of the receptors (workforce working on site) is considered medium as some workers may not be aware of their rights.			
Impact Significance	Negligible	Minor	Moderate	Major
	Since the magnitude is considered medium and sensitivity is medium, the impact on workers' health and safety during construction activities is considered to be of moderate significance.			

Mitigation Measures

The following mitigation measures shall be implemented during the construction phase to reduce any impacts on workers' health and safety and labour rights. The appointed contractor and CWWDA shall develop and implement a Workers Health and Safety Management System covering all contractors including the following measures:

- CWWDA shall require contractors to develop Human Resources Policy, which shall 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. The system shall include requirements for safey and health risk assessment and development of safety management plan prior to starting any works.
- CWWDA shall require its contractors to put in place policies in line with national legislation and CWWDA Code of Conduct and Policies.
- CWWDA shall establish contractual clauses to be embedded in the contracts of the contractor that require adherence to Kenyan law and international standards to be upheld related to worker rights and providing the contractor and CWWDA with the right of audit.
- CWWDA require that contractors 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.

- Pre-employment medical assessments shall 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 a pre-employment medical assessment include a safer working environment, reduction in workplace injuries, minimised downtime, matching the capacity of the employee with the role, and overall recruitment cost and risk reduction.
- CWWDA shall ensure that training on health and safety measures is provided to all workers prior to starting to work on the project and that supervisors have adequate experience to deliver on their responsibilities.
- CWWDA shall implement regular health and safety checks and audits of its workers, contractors 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 shall develop and implement a Workers Grievance Mechanism for the Project workforce including contractors and subcontractors.
- Contractor shall ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents.
- CWWDA shall 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.
- CWWDA shall ensure that adequate clean water, adequate food, and access to medical care is provided to all workers on the worksite.
- Contractor shall develop a Waste Management Plan for the operation phase with clear guidelines for the management of operation waste.
- Mandatory training for all project workers on safety and health
- Development of emergency preparedeness and response plan

Operation Phase Impacts

Similar to the construction phase, the operation phase may also lead to occupational health and safety issues in particular with respect to operational risks by workers in terms of OHS as outlined in 8-28 above. Any health and safety and labour rights related impact during the operations phase will be limited to a small number of workers and will be permanent over the operation phase. The magnitude is therefore considered small.

Table 8-29: Operation Impact Significance on Workers Health and Safety

Impact	**Workers Health and Safety and Rights during Operation**			
Impact Nature	Negative	Positive	Neutral	
	Poor planning, non-compliance with health and safety best practice and labour rights can result in injuries or fatalities.			
Impact Type	Direct	Indirect	Induced	
	Resulting from a direct interaction between the Project (i.e., increased project traffic, open excavations,) and the workforce.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	Injuries and fatalities could have permanent impacts on workers and their families.			

Impact Extent	Local	Regional	International	
	The workforce will be primarily contracted from project area and neigbhouring Counties			
Impact Scale	The impact scale is therefore medium.			
Frequency	The frequency is considered to be infrequent as the workforce and the employer is expected to enforce the use of PPEs and health and safety measures.			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the parameters above and considering the embedded measures in place the magnitude is considered to be medium.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	The sensitivity of the receptors (workforce working on site) is considered medium as some workers may not be aware of their rights.			
Impact Significance	Negligible	Minor	Moderate	Major
	Since the magnitude is considered medium and sensitivity is medium, the impact on workers' health and safety during construction activities is considered to be of moderate significance.			

Mitigation Measures

The following mitigation measures will be implemented during the operation phase to reduce any impacts on workers' health and safety and labour rights.

- CWWDA shall require contractors to develop 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. The system shall include requirements for safey and health risk assessment and development of safety management plan prior to starting any works.
- CWWDA shall require its contractors to put in place policies in line with national legislation and CWWDA Code of Conduct and Policies.
- CWWDA shall establish contractual clauses to be embedded in the contracts of the contractor that require adherence to Kenyan law and international standards to be upheld related to worker rights and providing the contractor and CWWDA with the right of audit.
- CWWDA require that contractors 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.
- Pre-employment medical assessments shall 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 a pre-employment medical assessment include a safer working environment, reduction in workplace injuries, minimised downtime, matching the capacity of the employee with the role, and overall recruitment cost and risk reduction.
- CWWDA shall ensure that training on health and safety measures is provided to all workers prior to starting to work on the project and that supervisors have adequate experience to deliver on their responsibilities.

- CWWDA shall implement regular health and safety checks and audits of its workers, contractors 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 shall develop and implement a Workers Grievance Mechanism for the Project workforce including contractors and subcontractors.
- Contractor shall ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents.
- CWWDA shall 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.
- CWWDA shall ensure that adequate clean water, adequate food, and access to medical care is provided to all workers on the worksite.
- Contractor shall develop a Waste Management Plan for the operation phase with clear guidelines for the management of operation waste.
- Mandatory training for all project workers on safety and health
- Development of emergency preparedeness and response plan

Decommissioning Phase: Worker's Health and Safety and Labour Rights

Typical activities for the decommissioning include excavation work, dismantling of the structures. During these activities, the use of personal protective equipment (PPE), will greatly manage the severity of hazards to which the workforce is exposed. The traffic management plan will also be used to manage road accidents. The impact is considered short-term and medium over the decommissioning phase. Since contractors are expected to operate according to international standards and are in possession of prior EHS training, the impact is of **moderate** significance. Mitigation measures during this phase will be similar to those in the construction phase.

Residual Impacts

The significance of the residual impacts on community health and safety after the implementation of mitigation measures is presented in **Table 8-30** below. The implementation of mitigation measures will contribute to reducing occupational health and safety risks and the risk of labour rights abuses significantly. However, the risk of potential accidents still exists and may potentially lead to injuries or fatalities for the workforce during construction and operation. This risk will be short-term during the construction phase and long-term during operations. With the implementation of mitigation measures the remaining impact significance is considered minor significance during construction and negligible during operation. In fact, during operations, knowledge and lessons learned in terms of health and safety and labour rights during the construction phase may extend to the operation phase and contribute to strengthening local knowledge and practices in Kenya.

Table 8-30: Residual Impact Significance on Occupational Health and Safety

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Health and safety of workers	Construction/Operation/Decommissioning	Moderate	Negligible to minor

8.3.11 Impacts on Community Health and Safety

The presence of the Project could affect the health, safety and well being of the communities on AoI. Increased Project-related traffic, civil works for site preparation including site clearance and excavation work, 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.

Construction activities are likely to expose the local communities to health and safety related risks. Local community members could be exposed to accidents which could lead to injuries or fatalities. Further external workers could bring with them communicable diseases including sexually transmitted diseases (STDs) that could be passed on to local communities. The Corona Virus Disease (COVID-19) pandemic (even though abated and under control) is also a communical disease that could be transmitted by workers on the site during construction and operation to the local communities.

Table 8-31. Potential Impacts on Community Health and Safety

Construction Phase	Operation Phase
Potential impacts on community safety, in particular road accidents. Environmental health: changes to the environment due to increased noise and vibrations, decreased air quality and, inadequate management of waste. Impact from workers presence and potential interaction with local populations. Potential spread of COVID-19 during the construction as a result of increased interaction of workers on site and local community members.	Potential spread of COVID-19 during the construction as a result of interaction of workers on site undertaking maintenance works and local community members. Potential impacts on community safety, in particular road accidents. Environmental health: changes to the environment due to increased noise and vibrations, decreased air quality and, inadequate management of waste

Table 8-32: Construction Impact Significance on Community Health and Safety

Impact	Community Health and Safety During Construction			
Impact Nature	Negative	Positive	Neutral	
	Poor planning, non-compliance with health and safety best practice and labour rights can result in injuries or fatalities.			
Impact Type	Direct	Indirect	Induced	
	Resulting from a direct interaction between the Project (i.e. increased project traffic, working at height, open excavations) and the workforce.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	Injuries and fatalities could have permanent impacts on workers and their families.			
Impact Extent	Local	Regional	International	
	The workforce will be primarily contracted from and other Counties in Kenya as well as from other countries for some higher skilled jobs.			

Impact Scale	The impact scale is considered small during operations as the workforce size will be reduced and maintenance activities will be periodic.			
Frequency	The impact is considered to be continous. The workforce is expected to be trained and the employer is expected to enforce the use of PPEs and health and safety measures. Lessons learned from the construction phase are expected to enhance the safety conditions and thus reducing the frequency of safety incidents during the operation and maintenance phase.			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the parameters above, and the embedded measures in place, the magnitude is considered small.			
Resource/ Receptor Sensitivity/Value/ Importance*	Low	Medium	High	
	The sensitivity of the receptors is considered low as workers will be mostly skilled permanent employees.			
Impact Significance	Negligible	Minor	Moderate	Major
	Considering the magnitude is medium and sensitivity is low, the impact on workers' health and safety during operations activities is considered to be of Moderate significance.			

Mitigation Measures

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

- Development and implementation of Waste Management Plan
- Development and implementation of Traffic Management Plan
- Development and implementation of Air Quality Management Plan
- Development and implementation of Noise Management Plan
- Development and implementation of GBV/SEA/SH Management Plan

Operation Phase

Operation activities linked to maintenance of the pipelines are likely to expose the local communities to health and safety related risks. Local community members could be exposed to road accidents from maintenance vehicles which could lead to injuries or fatalities. Further external workers could bring with them communicable diseases including sexually transmitted diseases (STDs) that could be passed on to local communities. The Corona Virus Disease (COVID-19) pandemic (even though abated and under control) is also a communical disease that could be transmitted by workers on the site during operation phase to the local communities.

Table 8-33: Operation Impact Significance on Community Health and Safety

Impact	**Community Health and Safety during Operation**			
Impact Nature	Negative	Positive	Neutral	
	Poor planning, non-compliance with health and safety best practice and labour rights can result in injuries or fatalities.			
Impact Type	Direct	Indirect	Induced	
	Resulting from a direct interaction between the Project (i.e. increased project traffic, working at height, open excavations) and the workforce.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	Injuries and fatalities could have permanent impacts on workers and their families.			
	Local	Regional	International	

Impact Extent	The workforce will be primarily contracted from and other Counties in Kenya as well as from other countries for some higher skilled jobs.			
Impact Scale	The impact scale is considered small during operations as the workforce size will be reduced and maintenance activities will be periodic.			
Frequency	The impact is considered to be continous. The workforce is expected to be trained and the employer is expected to enforce the use of PPEs and health and safety measures. Lessons learned from the construction phase are expected to enhance the safety conditions and thus reducing the frequency of safety incidents during the operation and maintenance phase.			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the parameters above, and the embedded measures in place, the magnitude is considered small.			
Resource/ Receptor Sensitivity/Value/ Importance*	Low	Medium	High	
	The sensitivity of the receptors is considered low as workers will be mostly skilled permanent employees.			
Impact Significance	Negligible	Minor	Moderate	Major
	Considering the magnitude is medium and sensitivity is low, the impact on workers' health and safety during operations activities is considered to be of Moderate significance.			

Mitigation Measures

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

- Development and implementation of Waste Management Plan
- Development and implementation of Traffic Management Plan
- Development and implementation of Air Quality Management Plan
- Development and implementation of Noise Management Plan
- Development and implementation of GBV/SEA/SH Management Plan

Decommissioning Phase

Decommissioning phase impacts shall be similar to those in the construction phase and the mitigation measures highlighted shall apply.

Residual Impacts

The significance of the residual impacts on community health and safety after the implementation of mitigation measures is presented in **Table 8-34** below.

Table 8-34: Residual Impact Significance on Community Health and Safety

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Community Safety (Road Accidents, Site Trespass, spread of COVID-19)	Construction/operation/decommissioning	Moderate	Minor
Environmental Health (noise and air)	Construction/operation/decommissioning	Moderate	Minor
Interaction with Project Workforce	Construction/operation/decommissioning	Moderate	Minor

8.3.12Impact on Community Safety Related to Road Traffic, Site Trespass Activities

The pipeline route alignment is significantly on the road reserve on both sides of the busy Nairobi-Mombasa Highway. During construction there will be an increase in traffic movements of heavy machinery and light vehicles on site and in access roads leading to the site. This will include trucks transporting 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 or pedestrians. The increase in movement of vehicles during the construction phase may result in greater disturbance and decreased wellbeing for those communities especially traders closest to the pipeline site working areas.

In practical locations, the project site will be fenced/hoarded during construction activities hence the risk of trespass is low during the day and at night (security officers will be stationed on site). Trespassing on site could result in accidents leading to injuries or even fatalities, especially due to the presence of machinery and open excavations, which could at times be partly filled with water. Young people, elders and children are most at risk of being injured. Vehicular accidents may also be significant if the trenches are not clearly marked out during excavation and trenching.

During operation, there will low traffic movements mainly from project maintenance vehicles and is not expected to significantly increase the risk of road traffic accidents and potential injuries or fatalities to other road users or pedestrians. The movement of vehicles during the operation phase will not result in greater disturbance and decreased wellbeing for those communities closest to the RoW site working areas.

Contractor shall also be required to operate according to best international practice. However, considering the potential risk posed to communities, the magnitude is considered medium. Receptor sensitivity is also rated as medium, resulting in moderate impact significance.

Table 8-35: Construction Impact Significance on Traffic Hazards and Site Access

Impact	**Community Safety**			
Impact Nature	Negative	Positive	Neutral	
	Increased traffic during the construction period may result in increased risk to road traffic accidents and the presence of unfenced site working areas near settlements may result in trespassing and potential injuries.			
Impact Type	Direct	Indirect	Induced	
	Impact that result from a direct interaction between the Project (i.e. increased traffic, unfenced work sites) and the local population.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
Impact Extent	Local	Regional	International	
	Beyond the project AoI especially the transportation of raw materials and finished product			
Impact Scale	The impact is considered as medium scale			
Frequency	The frequency is considered to be continuous during the construction and operation phase.			
Impact	Negligible	Low	Moderate	High

Magnitude	Based on the parameters above, the magnitude is considered to be medium considering the potential consequence of accidents.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	The sensitivity of the receptors (local population and road users including vehicle users, pedestrians and cyclists) is considered medium, as contractors will ensure that construction activities are undertaken in compliance with international standards.			
Impact Significance	Negligible	Minor	Moderate	Major
	Considering the magnitude and sensitivity are medium, the impact on the community safety during construction activities is considered to be of moderate significance.			

Mitigation Measures

- Provide safety temporary crossings over open trenches in community areas.
- Keep any trenches free of water accumulation
- Limiting the length of open trenches that what can be worked on and backfilled within the shortest time possible.
- Control movement of equipment and workers where works are to be done on either side of the highway.
- Community awareness on safety risks
- Training of drivers on safe driving

Operation Phase Impacts

During the operation phase, adverse impacts and risks associated with community safety and site access with respect to traffic hazards will occur when maintenance operations are implemented and impacts will be similar to those in the construction phase but low in magnitude.

Table 8-36: Operation Impact Significance on Traffic Hazards and Site Access

Impact	**Community Safety**			
Impact Nature	Negative	Positive	Neutral	
	Increased traffic during the construction period may result in increased risk to road traffic accidents and the presence of unfenced site working areas near settlements may result in trespassing and potential injuries.			
Impact Type	Direct	Indirect	Induced	
	Impact that result from a direct interaction between the Project (i.e. increased traffic, unfenced work sites) and the local population.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
Impact Extent	Local	Regional	International	
	Beyond the project AoI especially the transportation of raw materials and finished product			
Impact Scale	The impact is considered as medium scale			
Frequency	The frequency is considered to be continuous during the construction and operation phase.			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the parameters above, the magnitude is considered to be medium considering the potential consequence of accidents.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	The sensitivity of the receptors (local population and road users including vehicle users, pedestrians and cyclists) is considered medium, as contractors will ensure that construction activities are undertaken in compliance with international standards.			

Impact Significance	Negligible	Minor	Moderate	Major
	Considering the magnitude and sensitivity are medium, the impact on the community safety during construction activities is considered to be of moderate significance.			

Mitigation Measures

- Provide safety temporary crossings over open trenches in community areas.
- Keep any trenches free of water accumulation
- Limiting the length of open trenches that what can be worked on and backfilled within the shortest time possible.
- Control movement of equipment and workers where works are to be done on either side of the highway.
- Community awareness on safety risks
- Training of drivers on safe driving
- CWWDA and contractor shall develop and implement a Traffic Management Plan covering aspect 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

Residual Impacts

The significance of the residual impacts impacts and risks associated with community safety and site access with respect to traffic hazards after the implementation of mitigation measures is presented in **Table 8-37** below.

Table 8-37: Residual Impact Significance significance on Traffic Hazards and Site Access

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Significance on Traffic Hazards and Site Access	Construction/operation/decommissioning	Moderate	Minor

8.3.13 Impact on Environmental Health of Communities

During the construction phase, activities will result in changes to the physical environment, with the potential to affect the health and welfare of communities. There will be temporary increases in dust during the duration of the construction phase, which will be mostly localised to the site working areas and access roads. These are likely to result in increased disturbance and decreased wellbeing especially for residents closest to construction site and along unpaved access roads. There are no impacts on local air quality over the long term and therefore unlikely to result in a recordable increase in respiratory diseases in the population.

Similarly, the construction is likely to result in temporary increased noise levels for residents close to the site working area. The increase in noise is likely to result in disturbance and decreased wellbeing for those closest to the construction activities. However, this will be limited to construction hours and sleep disturbance is unlikely assuming construction work will be undertaken during daytime hours and specifically due

to the project location which is mainly along the already noisy Nairobi-Mombasa highway and is not close to settlements.

Project construction will also entail some temporary, localized, ground works that will generate vibrations. Depending on the soil characteristics and on the distance to the nearest building, these activities could produce vibrations for houses in the vicinity. The contractor will be encouraged to make use of the local manual labour to reduce this impact as a mitigation measurer. Impacts could range from the level of temporary nuisance and disturbance, with no actual damage to buildings.

Waste production as a result of the construction and operation activities is unlikely to impact on the health of communities since most of the waste will be placed in the appropriate covered waste containers, and transported periodically to licensed dumpsites, and therefore opportunities for communities to come into contact with waste will be minimal. Contractor will reinstate and rehabilitate construction site including repairing any damage caused as part of the construction activities. The impacts on environmental health during construction are temporary in nature for the duration of the construction phase. Considering the temporary nature of the works and the sequential approach, the magnitude is considered medium.

Receptor sensitivity is also considered medium as receptors will include children, old people and others that may be susceptible to changes to environmental quality. The impact significance is therefore considered moderate.

Table 8-38: Construction Impact Significance on Communities' Environmental Health

Impact	**Environmental Health**			
Impact Nature	Negative	Positive	Neutral	
	Construction activities have the potential to impact on environmental health which may translate into decreased localized air quality and increase in noise emission and associated disturbance.			
Impact Type	Direct	Indirect	Induced	
	Impacts that result from a direct interaction between the Project (i.e. air and noise emissions, vibrations, changes into visual environment and generation of waste) and the population on AoI			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The effect is considered temporary since it is expected to be limited to the duration of construction activities.			
Impact Extent	Local	Regional	International	
	Impact limited to the Study Area and surrounding access roads			
Impact Scale	The impact is considered medium.			
Frequency	The frequency is considered to be occasional.			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the parameters above, the magnitude is considered to be medium.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	Receptor sensitivity is considered medium as receptors may experience disturbance and decreased well-being.			
Impact Significance	Negligible	Minor	Moderate	Major
	Considering both the magnitude and receptor sensitivity are medium, the impact on the community health due to environmental changes during construction activities is considered of moderate significance.			

Mitigation Measures

Mitigation measures are similar to the mitigation measures on noise, air, community health and safety, waste management in sections above.

Operation Phase Impacts

During the operation phase, adverse impacts and risks associated with communities' environmental health will occur when maintenance operations are implemented and impacts will be similar to those in the construction phase but low in magnitude.

Table 8-39: Operation Impact Significance on Communities' Environmental Health

Impact	**Environmental Health**			
Impact Nature	Negative	Positive	Neutral	
	Operation activities have the potential to impact on environmental health which may translate into decreased localized air quality and increase in noise emission and associated disturbance.			
Impact Type	Direct	Indirect	Induced	
	Impacts that result from a direct interaction between the Project (i.e. air and noise emissions, vibrations, changes into visual environment and generation of waste) and the population on AoI			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The effect is considered temporary since it is expected to be limited to the duration of construction activities.			
Impact Extent	Local	Regional	International	
	Impact limited to the Study Area and surrounding access roads			
Impact Scale	The impact is considered medium.			
Frequency	The frequency is considered to be occasional.			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the parameters above, the magnitude is considered to be medium.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	Receptor sensitivity is considered medium as receptors may experience disturbance and decreased well-being.			
Impact Significance	Negligible	Minor	Moderate	Major
	Considering both the magnitude and receptor sensitivity are medium, the impact on the community health due to environmental changes during construction activities is considered of moderate significance.			

Mitigation Measures

Mitigation measures are similar to the mitigation measures on noise, air, community health and safety, waste management.

Decommissioning Phase

Decommissioning phase impacts will be similar to those in the construction phase and the mitigation measures highlighted will apply.

Residual Impacts

The significance of the residual impacts on community health and safety after the implementation of mitigation measures is presented in **Table 8-40** below.

Table 8-40: Residual Impact Significance on Child Protection

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Communities' Environmental Health	Construction/operation/decommissioning	Moderate	Minor

8.3.14 Potential Interactions with Project Workforce

Indirectly, results of the development activities might affect population growth. It is predicted that the following demographic processes will take place:

1. **In-migration:** People from other areas will move to the area in search of new opportunities. The opportunities may not be directly in the project; they could be in-coming to conduct business as a result of the project.
2. **Presence of temporary workers:** It is not expected that the area will experience substantial labor influx.

Without mitigation, the primary impact of in-migration will be an increase in population, physical expansion of project affected areas and informal development.

1. The potential for unplanned and uncontrolled growth could lead to issues surrounding safety, sanitation, and service delivery.
2. Where in-migrants compete directly against local people, especially for unskilled jobs, it may result in tension, and possible aggression, between job seekers within the affected areas, and the country more widely.
3. In-migration can also lead to negative social change and an erosion of cultural values, as migrants bring in different cultural norms and values and attitudes to traditional leadership systems.
4. An influx of in-migrants is likely to lead to an increase in communicable diseases such as TB, HIV/AIDS and other sexually transmitted diseases, COVID-19 exacerbated by increased pressure on health care facilities and the possible introduction of new diseases.
5. Influx of in-migrants is likely to lead to the risk of GBV (SEA and SH).

The Project workforce may be housed in open or closed accommodation camps. Interaction with nearby communities is therefore very likely and could potentially lead to an increased transmission of communicable diseases and sexually transmitted diseases within these communities. This is a particular risk in relation to communities located close to worker camps where the potential for interaction is highest.

In addition, considering that HIV/AIDS prevalence in Kenya as of 2018 was approximately 4.7% among adults aged 15–49 years old, transmission of HIV may also occur. Prostitution may also be an issue considering the low levels of employment opportunities, and it is possible that some women in settlements close to the construction area may resort to prostitution for short term economic gain.

Based on the above, interaction between project workforce and local communities in the Study Area is considered very likely during the construction phase. Receptor sensitivity is considered high as the low levels of employment opportunities might encourage prostitution and transmission of STDs and communicable diseases. This results in a moderate impact significance.

Table 8-41: Construction Impact Significance on Community Interaction with WorkForce

Impact	**Interaction with Project Workforce**			
Impact Nature	Negative	Positive	Neutral	
	The presence of Project Workforce will lead to interaction with the local communities which will potentially result in increased transmission of communicable diseases and sexually transmitted diseases.			
Impact Type	Direct	Indirect	Induced	
	Impacts that result from a direct interaction between the Project workforce and the population in the project AoI.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The effect is considered short term as it is expected to last throughout the construction period.			
Impact Extent	Local	Regional	International	
	Impact limited to the Study Area and nearby urban centres.			
Impact Scale	Moderate			
Frequency	The frequency is considered to be continuous throughout the construction phase.			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the parameters above, the magnitude is considered small since work forces is small.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	Receptor sensitivity is considered high. The low levels of employment opportunities might encourage prostitution and transmission of STDs, and children and the elderly are considered particularly vulnerable to the transmission of communicable diseases.			
Impact Significance	Negligible	Minor	Moderate	Major
	Since impact magnitude is considered small and receptor sensitivity is high, the impact on community health due to interactions with the Project Workforce during construction activities is considered of moderate significance.			

Mitigation Measures

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

- Develop and implement Labour Influx Management Plan
- Emphaise on local recruitment/hire and disseminate/create awareness on the same to minimize influx
- Ensure all workers including contractors and subcontractors receive education on symptoms of communicable diseases of concern and STDs.
- Ensure all the COVID-19 protocols by the Ministry of Health are adhered to including social distancing, use of masks, hand washing, and use of sanitizers and vaccination of workers
- Contractor to Provide access to health care for those injured by its activities.
- Ensure that work sites are fenced and that signs are put up around work fronts and construction sites advising people of the risks associated with trespass.

When work fronts are less than 100 metres from a community or house, employ security guards from the local community to prevent trespass.

- CWWDA shall extend the Worker Code of Conduct to include guidelines on worker –community interactions and shall provide training on the worker code of conduct to all employees including contractors and subcontractors as part of the induction process.
- CWWDA shall implement a Community Grievance Mechanism.
- CWWDA and contractor shall develop and implement a Traffic Management Plan covering aspect 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

Table 8-42: Operation Impact Significance on Community Interaction with Workforce

Impact	**Interaction with Project Workforce**			
Impact Nature	Negative	Positive	Neutral	
	The presence of Project Workforce will lead to interaction with the local communities which will potentially result in increased transmission of communicable diseases and sexually transmitted diseases.			
Impact Type	Direct	Indirect	Induced	
	Impacts that result from a direct interaction between the Project workforce and the population in the project AoI.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The effect is considered short term as it is expected to last throughout the construction period.			
Impact Extent	Local	Regional	International	
	Impact limited to the Study Area and nearby urban centres.			
Impact Scale	Moderate			
Frequency	The frequency is considered to be continuous throughout the construction phase.			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the parameters above, the magnitude is considered small since work forces is small.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	Receptor sensitivity is considered high. The low levels of employment opportunities might encourage prostitution and transmission of STDs, and children and the elderly are considered particularly vulnerable to the transmission of communicable diseases.			
Impact Significance	Negligible	Minor	Moderate	Major
	Since impact magnitude is considered small and receptor sensitivity is high, the impact on community health due to interactions with the Project Workforce during construction activities is considered of moderate significance.			

Decommissioning Phase: Community Interactions with Workforce

Increased Project-related traffic for site decommissioning will cause change to the environment due to increased noise, decreased air quality, waste handling or disposal, accidental leaks and spills, and the presence of the Project workforce all present potential hazards for the health and safety of local communities. The community engagement plans, mechanisms and associated measures used during construction and operation will also be used in this phase.

Residual

The significance of the residual impacts on community interaction with work force after the implementation of mitigation measures is presented in **Table 8-43** below.

Table 8-43: Residual Impact Significance on Community Interaction with Community

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Interaction with Project Workforce	Construction/operation/decommissioning	Moderate	Minor

8.3.15 Gender Based Violence

Gender-Based Violence (GBV) is an umbrella term for any harmful act that is perpetrated against a person's will and that is based on socially ascribed (i.e. gender) differences between males and females. It includes acts that inflict physical, sexual or mental harm or suffering, threats of such acts, coercion, and other deprivations of liberty. These acts can occur in public or in private.

An influx of in-migrants may lead to Gender Based Violence (GBV) (Sexual Exploitation and Abuse (SEA) and Workplace Sexual Harrassment (SH) in the workplace. Although the project is not expected to have a large influx of workers, the in-migration may increase the demand for sex work. Furthermore, wages for workers in a community can lead to an increase in transactional sex. The risk of incidents of sex between laborers and minors, even when it is not transactional, can also increase. The Project may create changes in the project affected communities and can cause shifts in power dynamics between the community members and within households. Male jealousy, a key driver of GBV, can be triggered by labor influx on a project when workers are believed to be interacting with community women.

Table 8-44: Construction Impact Significance on GBV/SEA/SH

Impact	Gender Based Violence			
Impact Nature	Negative	Positive	Neutral	
	The presence of Project Workforce will lead to interaction with the local communities which will potentially result in increased transmission of communicable diseases and sexually transmitted diseases.			
Impact Type	Direct	Indirect	Induced	
	Impacts that result from a direct interaction between the Project workforce and the population in the project AoI.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The effect is considered short term as it is expected to last throughout the construction period.			
Impact Extent	Local	Regional	International	
	Impact limited to the Study Area and nearby urban centres.			
Impact Scale	Moderate			
Frequency	The frequency is considered to be continuous throughout the construction phase.			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the parameters above, the magnitude is considered small since work forces is small.			
	Low	Medium	High	

Resource/ Receptor Sensitivity	Receptor sensitivity is considered high. The low levels of employment opportunities might encourage community interaction with workforce and leading to GBV.			
Impact Significance	Negligible	Minor	Moderate	Major
	Since impact magnitude is considered small and receptor sensitivity is high, the impact on GBV due to interactions with the Project Workforce during construction activities is considered of moderate significance.			

Mitigation Measures

The following mitigation measures shall be implemented during the pre-construction, construction and decommissioning phases to mitigate the risk of GBV-SEA/SH.

- CWWDA shall extend the Worker Code of Conduct to include guidelines on worker-community interactions and shall provide training on the worker code of conduct to all employees including contractors and subcontractors as part of the induction process.
- Community sensitization including disseminating information on GBV (SEA and SH) risks and management protocols.
- Implementing a GBV-SEA/SH management plan to mitigate and respond to GBV cases, including provision of referral pathways for survivors, establishment of a GRM which has a survivor-centred approach (that is sensitive and confidential).

Table 8-45: Operation Impact Significance on Gender Based Violence

Impact	**Gender Based Violence**			
Impact Nature	Negative	Positive	Neutral	
	The presence of Project Workforce will lead to interaction with the local communities which will potentially result in increased transmission of communicable diseases and sexually transmitted diseases.			
Impact Type	Direct	Indirect	Induced	
	Impacts that result from a direct interaction between the Project workforce and the population in the project AoI.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The effect is considered short term as it is expected to last throughout the construction period.			
Impact Extent	Local	Regional	International	
	Impact limited to the Study Area and nearby urban centres.			
Impact Scale	Moderate			
Frequency	The frequency is considered to be continuous throughout the operation phase.			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the parameters above, the magnitude is considered small since work forces is small.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	Receptor sensitivity is considered high. The low levels of employment opportunities might encourage community interaction with workforce and leading to GBV.			
Impact Significance	Negligible	Minor	Moderate	Major
	Since impact magnitude is considered small and receptor sensitivity is high, the impact on GBV due to interactions with the Project Workforce during operation activities is considered of moderate significance.			

Mitigation Measures

Similar to construction phase mitigation measures:

- CWWDA shall extend the Worker Code of Conduct to include guidelines on worker-community interactions and shall provide training on the worker code of conduct to all employees including contractors and subcontractors as part of the induction process.
- Community sensitization including disseminating information on GBV (SEA and SH) risks and management protocols.
- Implementing a GBV-SEA/SH management plan to mitigate and respond to GBV cases, including provision of referral pathways for survivors, establishment of a GRM that is sensitive and confidential.

Decommissioning Phase

Decommissioning phase impacts will be similar to those in the construction phase and the mitigation measures highlighted will apply.

Residual Impacts

The significance of the residual impacts on GBV-SEA/SHafter the implementation of mitigation measures is presented in **Table 8-46** below.

Table 8-46: Residual Impact Significance on Community Health and Safety

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Gender Based Violence	Construction/operation/decommissioning	Moderate	Minor

8.3.16 Child Protection

Violence Against Children (VAC) is defined as physical, sexual, emotional and/or psychological harm, neglect or negligent treatment of minor children (i.e. under the age of 18), including exposure to such harm that results in actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility, trust or power. This includes using children for profit, labor, sexual gratification, or some other personal or financial advantage. This also includes other activities such as using computers, mobile phones, video and digital cameras or any other medium to exploit or harass children or to access child pornography. The recruitment of children under the age of 18 during the construction is a potential risk and considered VAC. Based on current conditions in the sector it is assessed that the risk of child or forced labor is negligible, and already managed through national legislation and the proponent's corporate requirement.

Table 8-47: Construction Impact Significance on Child Protection

Impact	Child Protection/Violence Against Children			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The effect is considered short term as it is expected to last throughout the construction period.			

Impact Extent	Local	Regional	International	
	Impact limited to the Study Area			
Impact Scale	Moderate			
Frequency	The frequency is considered to be continuous throughout the construction phase.			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the parameters above, the magnitude is considered small since work forces is small.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	Receptor sensitivity is considered high. The low levels of employment opportunities might encourage children to seek for employement			
Impact Significance	Negligible	Minor	Moderate	Major
	Since impact magnitude is considered small and receptor sensitivity is high, the impact on during construction activities is considered of moderate significance.			

Mitigation Measures

The following mitigation measures shall be implemented during the construction phase to reduce any impacts on VAC.

- Preparing and implementing a child protection plan
- Employing persons aged 18+ years (in accordance with the labour laws of Kenya).

Operation Phase

Table 8-48: Operation Phase Impact Significance on Child Protection

Impact	Child Protection/Violence Against Children			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The effect is considered short term as it is expected to last throughout the construction period.			
Impact Extent	Local	Regional	International	
	Impact limited to the Study Area and nearby urban centres.			
Impact Scale	Moderate			
Frequency	The frequency is considered to be continuous throughout the operation phase.			
Impact Magnitude	Negligible	Low	Moderate	High
	Based on the parameters above, the magnitude is considered small since work forces is small.			
Resource/ Receptor Sensitivity	Low	Medium	High	
	Receptor sensitivity is considered high. The low levels of employment opportunities might encourage children to seek for employement			
Impact Significance	Negligible	Minor	Moderate	Major
	Since impact magnitude is considered small and receptor sensitivity is high, the impact on during operation activities is considered of moderate significance.			

Mitigation Measures

The following mitigation measures shall be implemented during the operation phase to reduce any impacts on VAC.

- Preparing and implementing a child protection plan
- Employing persons aged 18+ years (in accordance with the labour laws of Kenya).

Decommissioning Phase

Decommissioning phase impacts will be similar to those in the construction phase and the mitigation measures highlighted will apply.

Residual Impacts

The significance of the residual impacts on community health and safety after the implementation of mitigation measures is presented in **Table 8-49** below.

Table 8-49: Residual Impact Significance on Child Protection

Impact	Project Phase	Significance (Pre-Mitigation)	Residual Impact Significance (Post Mitigation)
Violence Against Children	Construction/operation/decommissioning	Moderate	Minor

8.3.17 Archaeology and Cultural Heritage Impacts

Baseline assessments have not identified cultural heritage sites on the proposed pipeline transmission routing and thus no valuable tangible cultural heritage structures and resources are likely to be impacted by the project. There were no cultural heritage and archaeological sites identified in the area. Further, there are no graves or cemeteries identified during the ESIA study.

During the construction activities the removal of vegetation might uncover cultural sites which can only be removed by the appropriate governmental structures and consultation with the traditional authorities. The potential impacts are likely to be temporary and short term and most of these can be avoided during the vegetation removal process. Based on the baseline data it is not expected that the planned activities will result in negative impacts over the existent cultural and archaeological sites.

Impact Assessment

Construction Phase

Based on the baseline data it is not expected that the planned activities will result in negative impacts over the existent cultural and archaeological sites. As there are no grave sites identified on site the likelihood of these impacts is low. The potential impact in case illegal grave sites are identified during the vegetation removal process, is direct and negative. The extent of the impact is presented is restricted to the project site and therefore local in nature. The magnitude of the impact is considered to be negligible. A Chance Finds Procedures has been developed (Annex B). Based on the analysis provided above, the impact of the project on cultural sites, will be a low negative impact pre-mitigation.

Table 8-50: Mitigation Impact Assessment

Impact	**Cultural Heritage during Construction**			
Impact Nature	Negative	Positive	Neutral	
	Disturbance to grave sites during vegetation removal and construction activities			
Impact Type	Direct	Indirect	Induced	
	Impact is as a result of a direct interaction between the project (i.e. construction activities) and potential cultural sites (e.g. grave sites) on site.			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	The effect is considered temporary as grave sites would be identified during the vegetation removal activities			
Impact Extent	Local	Regional	International	
	Impact is limited to AoI			
Impact Scale	The impact is considered to be of negligible scale.			
Frequency	Once off			
Impact Magnitude	Negligible	Low	Moderate	High
Resource/ Receptor Sensitivity/Value/ Importance*	Low	Medium	High	
	The receptors can be identified in the early stages of the process (e.g. vegetation removal and opening accesses). The sensitivity is considered low.			
Impact Significance	Negligible	Minor	Moderate	Major
	Considering the impact magnitude is negligible and the sensitivity is low, the overall significance is considered to be of negligible significance.			

Mitigation

The following standard mitigation measures shall be employed:

- Do not remove any cultural heritage including graves without prior consultation to the communities and fulfilling the legal requirements. Any removal of cultural heritage shall be conducted by the best available techniques.
- Implement a grievance procedure to ensure community concerns are addressed. Develop and implement a chance find procedure (based on procedures presented in annex B of this ESIA) which shall detail the appropriate course of action that must be followed for any relevant cultural heritage discoveries.

Operation Phase

During the operational phase there are not expected potential impacts on the cultural heritage as a result of the existence of the project. **Table 8-51** reflects the non-applicability of the significance of impacts on cultural heritage during the operation phase.

Table 8-51: Pre-Mitigation Impact Assessment

Impact	**Cultural Heritage during Operations**			
Impact Nature	Negative	Positive	Neutral	
	There are no expected impacts during operation			
Impact Type	Direct	Indirect	Induced	
	N/A			
Impact Duration	Temporary	Short Term	Long Term	Permanent
	N/A			

Impact Extent	Local	Regional	International	
	N/A			
Impact Scale	The impact is considered to be of negligible scale.			
Frequency	N/A			
Impact Magnitude	Negligible	Low	Moderate	High
Resource/ Receptor Sensitivity/Value/ Importance*	Low	Medium	High	
	N/A			
Impact Significance	Negligible	Minor	Moderate	Major
	N/A			

Residual Impact

The impact significance is negligible after mitigation measures during construction and no impacts are expected during operations. With the proposed mitigation measures, particularly the development of chance finding procedures the residual negative impacts on cultural resources are assessed to be of a low magnitude.

Table 8-52: Residual Impact Significance

Impact	Project Phase	Significance (Pre-mitigation)	Residual Impact Significance (Post-mitigation)
Damage of grave sites considered important by the local communities	Construction	Negligible	Negligible

8.3.18Cumulative Impacts

For the assessment of cumulative impacts for the proposed projects the main reference sources were the IFC Performance Standards.

The IFC Performance Standard 1 define cumulative impacts as "*those impacts that result from the incremental impact of the project when added to other existing, planned and reasonably predictable future projects and developments*".

Cumulative impacts are the result of a combination, or even the synergic effect of various past, present or future projects. The evaluation of cumulative impacts first requires that a list of Valued Environmental Components (VECs) be established from the global list of environmental components identified for the impact assessment. The selection of the VECs was based on their biophysical and/or socioeconomic importance and their capacity to generate cumulative negative effects with other projects in the areas crossed by the proposed Project.

A total of 7 VECs have been selected for the current assessment. They are listed below with the indicative aspects that will be considered for the evaluation of cumulative aspects:

- Water resources. Indicative aspects: surface water quality, groundwater quality and quantity.
- Soils. Indicative aspect: Stability and erosion.

- Nuisances (air quality, noise and vibration). Indicative aspects: increase noise/vibration levels and alteration to local air quality (dust and particulate emissions).
- Terrestrial habitat. Indicative aspects: loss of terrestrial habitat through project construction increase accessibility to land and induced local land use changes.
- Terrestrial fauna (birds, reptiles and amphibians, mammals). Indicative aspects: potential interaction causing injuries or death and movement limitations.
- Physical well-being. Indicative aspects: land tenure, housing conditions, livelihood and economic aspects, mobility, and health and safety (road users, local communities, and workers).
- Community relations and social justice. Indicative aspects: Community tensions and conflicts (equitable distribution of benefits.

The cumulative impact assessment also requires that a realistic area and time period be established within which past, present and future projects are identified. The area considered correspond to a 5 km zone around the project. As for the time period, an extent of two years in the past and five years in the future was retained to match the project's construction period. The various past, ongoing and upcoming projects potentially generating impacts that could be cumulative with those of the Project, were identified during the public consultation sessions, discussion with local authorities and consultation of Counties and main governmental agencies.

Existing, Planned and Reasonably Predictable Future Projects

Several sources have been reviewed and considered to determine whether there are existing, planned, or reasonably predictable future projects and developments within the project area and the Area of Influence, where potential environmental and social interactions may combine with the proposal to result in more or less significant overall impacts.

Field Activities and Stakeholder Consultations

Information gathered during field activities and consultations with various stakeholders, including authorities and local communities, revealed current issues related to previous projects in the project areas. This local knowledge was critical to understanding the historical and ongoing impacts that may affect or be affected by the proposed project.

The above plans and sources have been reviewed to identify potential projects and developments that could result in cumulative impacts with the proposed project. Specifically, projects within the project area and its vicinity were considered and examined to determine their potential contribution to cumulative impacts. This process involved identifying and assessing the impacts that could be caused or exacerbated by the interaction of these various developments, ensuring a comprehensive understanding of the potential cumulative effects on the environment and community.

In the following section, each of the identified existing and proposed projects and developments has been analysed and their respective impacts have been thoroughly examined. This analysis included an assessment of the potential environmental and social

impacts of each project, in combination with the proposed project. By assessing impact factors, cumulative impacts were systematically identified and expressed, providing a clear understanding of how these developments could collectively affect the project area and its surroundings. Finally, appropriate mitigation measures were identified and proposed to address and reduce these cumulative impacts to ensure sustainable development and minimise adverse impacts on the region. At present, there is little information about reasonably defined future developments in the AoI project, but by reviewing the sources, general projects and developments have been identified and described. As of April 2024, the Kenyan national government has several planned and ongoing infrastructure projects in the 3 Counties, including:

Table 8-53: Planned and Ongoing Projects

PROJECT NAME: MOMBASA NORTHERN BYPASS ROAD PROJECT Kenya National Highway Authority is proposing to construct the Mombasa Northern Bypass and Bamburi Link roads in Mombasa County. The Project comprises of two sections amounting to 38.6 km as follows: Mombasa Northern Bypass (27.1 Km) and Bamburi Link Road (11.5 Km). The Mombasa Northern Bypass Section targets to connect the Mombasa-Nairobi (A8) Highway at Miritini to the Mombasa—Malindi (A7) Road at Kwa Kadzengo, Mtwapa. The Bamburi Link Road is targeted to link the new Mombasa Northern Bypass Road to the Mombasa—Malindi (A7) Road at Bamburi. **Project Proximity to Pipeline**: The project run adjacent to the North mainland pipeline and is approximately 1km from the nearest point of contact. **Status:** The project works had stalled. A section of the road has been rendered impassable after the contractor ceased works after doing majority of the road. Of the 12km he did about 9km, leaving the most crucial section undone. The project was scheduled to be completed in March 2022.
PROJECT NAME: JOMVU-JITONI-RABAI ROAD PROJECT Kenya Urban Roads Authority commissioned the construction to bitumen standards of the Jomvu Kuu-Jitoni-Rabai Road project traversing Mombasa and Kilifi Counties. The contract comprised of construction to bitumen standard of 11.7km road with asphaltic concrete wearing course. **Project Proximity to Pipeline**: The project run adjacent to the North mainland pipeline and is approximately 1km from the nearest point of contact to the pipeline. **Status:** A section of the road has been rendered impassable after the contractor ceased works after doing majority of the road.
PROJECT NAME: MWACHE MULTI PURPOSE DAM PROJECT The Multipurpose Mwache Dam was identified by the Government of Kenya (GoK) as a flagship project under the Kenya Vision 2030 mission and also as a necessary facility to supplement water supply for Mombasa City and the adjacent areas in Kinango Sub County in Kwale County. It has been given high priority by Ministry of Water and Sanitation and Irrigation (MOWSI), the Coast Development Authority (CDA), and the Coast Water Works Agency (CWWA) and the National Treasury. The dam is proposed to be located immediately upstream of Mwache Creek (~4km) on Mwache River in Kasemeni and Mwavumbo Wards, Kinango Sub County of Kwale County. The Dam site is located on the Mwache River at Fulugani village in Kwale County, Kasemeni Location of Kinango Sub County about 22 km west of the city of Mombasa.

The Mwache Dam will supplement the water supply into Mombasa City and the local communities as well as supporting the local community in food production through small scale irrigation scheme. This will commence with an initial pilot scheme covering 100ha followed by a subsequent annual irrigated area of about 2,500ha. The target area for the pilot scheme is adjacent to the upper check dam. The Mwache Dam will improve the living standards of Kwale County and Mombasa residents through poverty alleviation and sustainable development. The large-scale multi-purpose water reservoir will be created to cater for public and industrial water supply and irrigation in order to effectively contribute towards regional and national socio-economic development.

Status: Progress of works to date is 40.46% complete.

Project Proximity to Pipeline: The project is approximately 300m from the pipeline. The proposed Transmission Mains to Mombasa West Mainland and Changamwe starts as a common trunk main from the proposed West Mainland Reservoir outlet at an outlet elevation of 95 masl traversing S.E. to cross the Nairobi-Mombasa Highway at approx. 250m S.E of the reservoir site, this section is located within Mazeras location of Kilifi County. Upon crossing the Nairobi-Mombasa Highway, the Transmission Pipeline to the West Mainland and Changamwe traverses Southeast, along the Highway for approx. 2.2km to the Mombasa Southern By-Pass interchange at Ch. 2+465, this section is also located within Mazeras Location of Kilifi County.

PROJECT NAME: MOMBASA-MARIAKANI (A109) HIGHWAY PROJECT LOT 1: DUALLING OF THE MOMBASA-KWA JOMVU (A109) SECTION. DUAL CARRIAGEWAY OF THE MOMBASA-MARIAKANI HIGHWAY

The project is located in the coastal region and forms part of the Mombasa-Nairobi (A8) Highway. The project starts at the Kwa Jomvu interchange and follows the alignment of the existing road through Miritini, Mazeras and Mariakani and ends just after he Mariakani weighbridge.

Status: Progress of works to date is 90.46% complete.

PROJECT NAME: MOMBASA SOUTHERN BYPASS HIGHWAY PROJECT

Dongo Kundu Bypass Highway also referred to as Mombasa Southern Bypass, is a highway under construction in Mombasa County. The highway will link Mombasa Mainland West with Mombasa Mainland South, without getting into Mombasa Island. The project roads are comprised of two roads, namely Mombasa Southern Bypass and Kipevu Link Road. Mombasa Southern Bypass branches off from Nairobi-Mombasa Road (A109) at Miritini then runs down to Tsunza Peninsula and Dongo Kundu, and finally emerges with Mombasa-Tanzania Road (A14). The Kipevu Link Road branches off from Mombasa Southern Bypass at Mwache then runs to Mombasa New Port Container Terminal. Mombasa Southern Bypass is about 20.0km and Kipevu Link Road is about 5.7 km.

Project Status: Currently ongoing

PROJECT NAME: THE SPECIAL ECONOMIC ZONE DEVELOPMENT PROJECT AT DONGO KUNDU

Dongo Kundu SEZ is approximately 3,000 acres large, adjacent to the Mombasa Port in Likoni Subcounty of Mombasa County. The zone is located in a strategic location with a high potential for development and high competitiveness in terms of logistics and facilities. It is in close proximity to the Mombasa Port, Mombasa Southern Bypass,

Standard Gauge Railway (SGR), and Moi International Airport. The project is part of Kenya's Industrial Plan, boosted by the revised draft SEZ regulations (2019) which offer incentives to companies operating in the zone. The SEZ is restricted to the KPA owned property in Dongo Kundu which falls under the administrative jurisdiction of the Likoni sub-County of County 001 (Mombasa). Within Likoni, the two villages covered by the proposed project area fall under the Mtongwe Ward of Likoni Constituency.
Status: Project is ongoing

PROJECT NAME: DEVELOPMENT OF MINI CITIES – MWAKIRUNGE
Since 1971, when the urban area was concentrated in the Mombasa Island, un-planned urbanization has been taking place in the mainland without proper land management and without forming a linkage or network to connect the urban areas. As a result, there is no clear subcentre system and hierarchy of settlements in Mombasa County. In terms of Housing, Mombasa County will need about 359,000 housing units by 2040 to accommodate the growing population, The additional housing demand will increase gradually, for example 82,000 by 2025 and therefore continuous and a volume of housing development is necessary in the future. When population distribution by area is considered, the areas around subcenters (Bamburi, Mtongwe, Dongo Kundu, Miritini, and Mwakirunge) have higher demand for housing.

PROJECT NAME: 800MW LIQUEFIED NATURAL GAS (LNG) POWER PLANT AT DONGO KUNDU
Kenya is turning to LNG due to its clean-burning, lower emission qualities and cheaper cost compared to traditional fossil fuels like diesel which is expensive with high levels of carbon dioxide emission. The government through the ministry of energy and petroleum therefore has proposed to set up LNG power plant at Dongo Kundu. The proposed project will be funded by the Ministry of Energy and Petroleum. Investment in LNG plants is also meant to cut reliance on hydroelectricity which is susceptible to weather changes such as drought. The project will be financed through a Public Private Partnership arrangement and is one of the several projects that are aimed at injecting 5,000 MW of power into the national grid.
Project Proximity to Pipeline: The project will be done approximately 1km from the west mainland pipeline project
Status: The project is still proposed

PROJECT NAME: STORM WATER DRAINAGE SYSTEM THAT WILL COVER MVITA, CHANGAMWE, JOMVU, KISAUNI, NYALI AND LIKONI SUB COUNTIES
The proposed project will be funded by the Government of Kenya (GoK) through a Public Private Partnership arrangement. Insufficient drainage, often causing floods, are considered a major problem in some of the settlements in Changamwe and Jomvu. A storm water drainage system project has therefore been planned for construction within these two sub counties.
Status: The project is still proposed

PROJECT NAME: PROPOSED IMPLEMENTATION OF BUS RAPID TRANSIT (BRT) IN MOMBASA COUNTY
Project According to the United States of America Federal Transit Administration, Bus Rapid Transit (BRT) is a high-capacity bus-based transit system that delivers fast and efficient service that may include dedicated lanes, busways, traffic signal priority, off-

board fare collection, elevated platforms and enhanced stations. The project is aimed at inter alia, decongesting and easing public transport within the County through implementation of a Bus Rapid Transit (BRT) project within the County, and especially on the Mombasa-Malindi Road which is most affected by traffic jams.
Status: The project is still proposed

PROJECT NAME: PROPOSED COUNTY GOVERNMENT OF MOMBASA HOUSING PROJECTS
The County Government of Mombasa (CGM) plans to set up high-rise residential apartments on government land. They are currently planning to construct 2,000 housing units in Miritini area in the first stage. Four types of units will be provided including studio apartment, one-bedroom apartment, two-bedroom apartment, and three-bedroom apartment for low to high income. The site will include not only residential zone, but also commercial zone, industrial zone, and institutions and recreation zone including hospitals, schools, and parks. Although the intended beneficiary of the Miritini housing units is the county government staff, this proposed housing scheme will be developed for the next housing projects for the public people in Mombasa County. Other probable areas where such projects are planned are Khadija, Changamwe, Mzizima, and Tudor Estate.
Status: The project is still proposed

PROJECT NAME: INFRASTRUCTURE UPGRADING IN JOMVU KUU, JOMVU MIKANJUNI, MKOMANI AND ZIWA LA NG'OMBE INFORMAL SETTLEMENTS WITHIN MOMBASA MUNICIPALITY
The Government of the Republic of Kenya has received financing from the World Bank toward the cost of the Second Kenya Informal Settlement Improvement Project (KISIP 2) and intends to apply part of the proceeds toward payments under the contract for Construction of Roads/Footpaths, Drainage Systems, Water Supply Works and Public Lighting Works in selected settlement schemes of Likoni 203, Kidunguni, Chaani, Misufini, Kisumu Ndogo and Majaoni within Mombasa County. The Kenya Informal Settlements Improvement Project (KISIP) aims to enhance access to basic services and improve tenure security in urban informal settlements in Kenya. This will be achieved by investing in infrastructure based on plans developed in consultation with the community, by supporting planning, surveying and issuance of land documents for residents of informal settlements, and by strengthening capacity of county administrations to deliver on their mandates.
Project Status: Currently ongoing

PROJECT NAME: FOUR LANE DIVIDED CARRIAGEWAY FOR MAGONGO ROAD (A- 109 L) FROM CHANGAMWE ROUNDABOUT TO JOMVU- MIRITINI
The project for a four-lane divided carriageway on Magongo Road (A-109 L) from Changamwe Roundabout to Jomvu-Miritini aims to significantly improve traffic flow and safety along this busy section of the road. This stretch is part of the larger Mombasa-Nairobi highway and is a critical link for the movement of goods to and from the port of Mombasa, one of the busiest in East Africa.
Project Status: Currently ongoing

North Mainland Transmisison Line Project

This project is financed by the World Bank and entails transmission of water from Mwache Dam to North Mainland. **Status:** The project is still proposed
South Mainland Transmission Line Project This project is financed by the World Bank and entails transmission of water from Mwache Dam to North Mainland. **Status:** The project is still proposed

All the projects with no official schedule available were kept for cumulative impact assessment as they are located adjacent or very near the Project's right-of-way.

Due to the inherent uncertainties in the nature of cumulative impacts, the CIA has by necessity been performed in a qualitative manner, but still provides useful context for determining the significance of the Project's contribution to the overall impacts. Because all of Project predicted residual adverse impacts are of **Minor** or **Moderate** significance, only a high-level CIA has been carried out, on the basis that the potential significant cumulative effects is low. Upon assessment of the project impacts, the cumulative impact assessment will focus impacts on atmospheric air quality, noise levels, water quality and use.

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.

I. Water Resources

Potential impacts of the Project on these VECs are defined by:

- 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

With the design principles applied and the implementation of the proposed mitigation measures, the resulting residual impacts were evaluated to be moderate to minor.

The various identified projects will affect these VECs as follows:

- All the projects in table 8-53 will essentially affect local groundwater quantity as they may require water intakes for its construction. These projects especially those that are linear (road projects) cross existing watercourses and could be affected by these projects.
- All the projects above will potentially affect these VECs and will have similar effects as with the water transmission pipeline project, that is: risk of loose soil and contaminant transport towards surface water, potential contamination of groundwater through excavation activities and groundwater extraction for construction and operation activities. For surface water potential effects, only the

road infrastructure projects cross watercourses and is also traversed by the water pipeline transmission Project.

Considering that:

- Past, present and future projects are either currently in construction (not in operation) as shown in table 8-53 or to be initiated at an undisclosed date.
- These project activities are expected to have similar moderate to minor impacts on these VECs;

Some cumulative effect may be anticipated. However, with the application of the standard and specific mitigation measures presented in section 8.3.9, the overall residual cumulative impact should remain **moderate to minor.**

II. Soils

Potential impacts of the water pipeline transmission line project on this VEC are essentially associated with pre-construction and construction and operation activities and are defined by:

- Affecting soil stability in steep areas during land clearing, soil movements which could generate or accentuate existing erosion.

With the design principles applied and the implementation of the proposed mitigation measures, the resulting residual impacts were evaluated to be **moderate to minor**. The various identified projects will affect this VEC as follows:

- The road infrastructure projects, Mwache Dam, household development project are located in areas with a steep slope and could generate soil instability and erosion. These project sites are located close to the water supply project.
- These linear projects are also located or traverse sections on relatively flat land but may imply work near watercourse crossings thus potentially affecting the slopes of their embankments.

Considering that:

- Project potentially affecting existing slopes are located near the proposed water transmission pipeline Project);
- The road infrastructure projects are likely to affect the same watercourse crossings as that of the water transmission pipeline Project

With the application of the standard measures presented in section 8.3.5xx overall cumulative effect would be no greater than moderate.

III. Nuisances

The nuisances VEC includes effects on noise as well as on air quality. Potential impacts of the proposed water transmission line Project on these VECs are defined by:

- Increasing temporarily noise levels, dust emissions and combustion gases emissions during the construction phase;
- Increasing permanently, although moderate, noise levels associated with the road infrastructure projects. The resulting residual impact related to dust emissions was evaluated to be minor for both the construction and operation phases. For noise generation, the resulting residual impact was evaluated to be moderate for the construction phase.

The various identified projects will affect this VEC for the same reasons as for the water transmission pipeline Project, that is: temporary local noise and dust generation increase during construction activities and permanent noise increase during operation but mainly for the road infrastructure projects only.

Considering that:

- All projects considered will have a similar moderate effect on local air quality through dust and particle generation during their construction activities.
- All the linear projects should have minimal to no effect on local air quality (dust and particle generation) at operation phases. Non-linear projects are not expected to have air quality impacts during the operation phase
- The linear projects will generate similar impact levels (moderate) for noise as with the pipeline Project during construction activities while the housing development, SEZ, and LNG projects are expected to have a minor effect (as they are shorter in duration, more localized and not necessarily close to sensitive receptors);
- City housing projects should not generate any significant noise levels during their operation.

The combined development of the proposed project and major infrastructure projects, including airport expansion and road construction, are likely to have an impact on air quality and increase greenhouse gas (GHG) emissions. Construction activities generate dust and particulate matter, while the use of heavy machinery and increased vehicle traffic contribute to higher levels of nitrogen oxides (NOx), sulphur dioxide (SO2) and carbon monoxide (CO). This increase in air pollutants and GHG emissions can affect air quality. It is expected that air quality will be impacted due to cumulative impacts of additional machines and vehicles along the project RoW. The source for air pollution from the transmission line construction shall be the excavation which shall be carried out during benching and foundation work. The other sources of air contaminants will be from the additional worker camps where wood and kerosene may be the main fuel for cooking and heating.

Cumulative effects for both air quality and noise are to be expected during construction activities with all the identified projects.

Considering the application of the standard and specific measures presented in section 8.3.4 and 8.3.6, it is expected that overall residual cumulative effects will remain respectively **minor** and **moderate** for air quality and noise considering the duration of construction activities and will not result in a measurable contribution that could have an impact on climate change. The net impact of the Project on Air Quality is **small** and **transient**, because air pollution will be generated at the sporadically spread along the transmission line route which is mostly along the road reserve and will be limited to the pre-construction and construction period. Furthermore, specific mitigation measures were proposed in the section 8.3.6 to help reducing significantly dust emission and partially also exhaust emissions.

At the operation phase of the project, cumulative effects are not to be expected essentially for noise other than for the road projects. All other projects will not generate significant noise levels at operation phase. The expected cumulative effect between the water pipeline transmission project, and the other projects should be **moderate** to **minor**. As for the cumulative effect of the roads project, construction activities should be completed by the time those of the pipeline will be realized in this area, thus the effects should be minor.
However, during operation of the road infrastructures, there will be some cumulative effects between road activities. Resulting cumulative effect is expected to be **moderate** in the area of the roads infrastructures.

IV. Terrestrial Habitat

Potential impacts of the water pipeline transmission Project on this VEC are essentially associated with pre-construction and construction activities and are defined by:

- 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;

Considering the limited loss of vegetation to be affected within the road reserve and its existing degraded condition, with the implementation of the mitigation measures identified, the magnitude of the residual impact on terrestrial habitat was assessed as **minor**.

The past, present and future projects identified in the vicinity of the project will mostly affect terrestrial habitat by generating further habitat loss in the project area and contributing to additional fragmentation of the terrestrial landscape. Further road infrastructure and developments in the area can also lead to population growth, creating additional land conversions and loss of terrestrial habitat. As for the housing developments, the sites are located in built up areas with no terrestrial habitats.

Considering that:

- Past, present and future projects are expected to cause additional terrestrial habitat loss and fragmentation.
- These projects activities are expected to have variable impacts on these VECs.

Cumulative effect is anticipated. However, considering the existing level of degradation of terrestrial habitat, the overall residual cumulative impact should be **minor**.

V. Terrestrial Fauna

The terrestrial VEC includes effects on avifauna, herpetofauna and small and large mammals within the Project area. Potential impacts of the proposed water transmission pipeline Project on these VECs are defined by:

- Habitat degradation or modification through construction work.

With the mitigation measures, the magnitude of the residual impacts was identified as **minor**.

The past, present and future projects identified in the vicinity of the project will mostly affect terrestrial habitat by generating further habitat loss in the project area and contributing to additional fragmentation of the terrestrial landscape. Further road infrastructure and developments in the area can also lead to population growth, creating additional land conversions and loss of terrestrial habitat. As for the housing developments, the sites are located in built up areas with no terrestrial habitats.
Considering that:

- Past, present and future projects are expected to cause additional disturbance on terrestrial fauna; this may cause them to avoid areas where construction works are carried out and areas where there is high road traffic noise.
- These projects activities are expected to have variable impacts on these VECs.

Cumulative effect is anticipated. However, considering the existing level of degradation of terrestrial habitat, the overall residual cumulative impact should be **minor.** Past, present and future projects are expected to cause additional disturbance on terrestrial fauna; this may cause them to avoid areas where construction works are carried out and areas where there is high road traffic noise. Cumulative effect is anticipated. The multiplication of linear infrastructure and increased traffic will likely have significant effect on wildlife. Nonetheless, impact of this project on wildlife will be minor due to the absence of wildlife in project AoI.

VI. Physical Well-Being

This VEC includes effects on land tenure, housing conditions, livelihoods and economic activities, mobility, and health and safety. Some impacts are covered in previous sections and are therefore not assessed here. These include:
Temporary increases in dust, particles, and pollution during pre-construction and construction activities potentially affecting livelihoods (agricultural crops), and human health. Potential impacts of the proposed Project on physical well-being are defined by:

- Changes in land tenure due to required land for the project
- Reduced available land for agriculture, livestock, resulting from the use of land
- Temporary displacement of street vendors using the right-of-way.
- Increased travel time and more difficult access to health services, key economic activity locations (e.g., access to suppliers, business and major tourism locations, and economic outlets), and sociocultural activity locations caused by traffic disruptions (increased circulation and traffic diversion) during pre-construction and construction activities.
- Temporary barrier effect for pedestrians and livestock during construction preventing crossing at their preferred locations, thereby increasing travel time.

Negative impacts on health and safety including:

- Increased worker insecurity, fatigue, and stress potentially generated by poor labour conditions and high levels of casualization (informality).
- Increased risk of injuries and physical and mental illnesses for workers caused by a dangerous work environment as a result of poor health and safety conditions.
- Increased risk of gender-based violence (including sexual abuse) brought by outside workers and job seekers or by local workers triggered by poor labour conditions.

- Increased risk of rising prevalence of HIV/AIDS and sexually transmitted infections (STIs) following the influx of workers and job seekers.
- Increased risk of crime in surrounding communities either through crimes directly perpetrated by newcomers (e.g., assault, theft, etc.) or indirectly through their engagement in illicit activities such as drug use and prostitution;
- Increased proliferation of disease-carrying insects such as dengue and malaria as a result of stagnant water-filled holes produced by earthworks.

Considering that land requirement is only potential and that there is an existing RAP prepared and to be implemented and managed by CWWDA, proper compensation is incorporated in the RAP. Thus, the residual impact magnitude for land tenure was determined to be minor. The residual impact magnitude for housing conditions following noise mitigation measures was evaluated as minor to moderate. While proposed mitigation measures do not reduce the intensity of health consequences for affected individuals, they greatly reduce the risk posed by the Project of health and safety impacts. As a result, the residual impact magnitude for health and safety was assessed as **moderate**.

The various identified projects will affect these VECs as follows:

- All projects have the potential to affect the housing market. Those associated with nuisances will affect house value in the same way as the water transmission pipeline Project, i.e., they will lower the value of houses directly affected by nuisances and potentially increase the value of others. Other projects will likely increase house value and risk accelerating land and housing speculation.
- All projects except the housing development projects, SEZ and LNG (are located in land owned by national and or county government) have the potential to impact land tenure and livelihoods through the acquisition of land.
- All projects, carry the same risk as the water transmission pipeline Project with regards to the influx of workers and job seekers in terms of increased fishing competition, GBV, and the transmission risk of HIV/AIDS and STIs
- All projects carry the same risk as the water transmission pipeline Project on the labour condition VEC, i.e., poor labour conditions, poor health and safety conditions, and high levels of casualization (informality).
- All projects may accentuate the proliferation of disease-carrying insects during pre-construction and construction activities.
- The road projects will cause traffic disruptions during pre-construction and construction activities.

Considering that:
Past, present and future projects are expected to affect the housing market, land tenure, livelihoods, health and safety and mobility.

Cumulative effect is anticipated. Impacts on the housing market will be location-specific in relation to each project. This cumulative impact is therefore likely to vary from **minor** to **moderate.** Implementation of standard and specific labour mitigation measures (Section 8.3.14, 8.3.15, and 8.3.16) by all identified projects should result in a residual cumulative effect of moderate magnitude. The multiplication of construction projects, especially for

large infrastructures, will affect land tenure and livelihoods through the acquisition of land. This will intensify the influx of workers and job seekers and aggravate their potential impacts on local communities' health and safety.

Complementarity and coherence of mitigation measures between projects is important. It should be ensured that the combined infrastructure projects do not threaten land-based livelihoods by avoiding loss of agriculture, livestock and/or offer adequate compensation for long-term effects. With application of these mitigation measures, the residual cumulative impact should be **moderate**. Where possible, a regional strategy for interaction with and integration of outsiders including, but not limited to, the standard and specific mitigation measures related to the influx of workers presented in Sections 8.3.14, 8.3.15, and 8.3.16 should be developed in partnership with affected counties to minimize impacts. Nevertheless, the magnitude residual cumulative health and safety impacts are likely to remain moderate during construction and operation. Overall, the magnitude of residual cumulative impacts on physical well-being is expected to be **moderate**.

VII. Community Relations and Social Justice

This VEC includes effects on gender and community relations. While some impacts in this section intersect with physical well-being, they are also addressed here because they will increase affected peoples' marginalization. Potential impacts of the proposed Project on community integrity and social justice are essentially associated with pre-construction and construction activities (unless indicated otherwise) and defined by:

- Gender imbalance in employment which contributes to perpetuating women economic dependency and further entrench gender-based roles;
- Land leasing and purchase of natural resources that may benefit socially recognized men at the expense of marginalized groups including women, especially widows, single mothers and youth. These effects are especially acute for women and youth in patriarchal communities under community land tenure;
- Increased gender-based violence (including sexual abuse) brought by outside workers and job seekers or by local workers triggered by poor labour conditions. Women and girls are especially vulnerable due to their marginalization and the fact that they walk often and on long distances;
- Workers and job seekers fathering children and abandoning mothers after conclusion of construction work;
- Rising prevalence of HIV/AIDS and sexually transmitted infections (STIs) following the influx of workers and job seekers
- Increased crime in surrounding communities either through crimes directly perpetrated by newcomers (e.g., assault, theft, etc.) or indirectly through their engagement in illicit activities such as drug use and prostitution. Increased crime can exacerbate inequities, furthering the marginalization of vulnerable people, and affect local communities' sense of security;
- Indigenous culture erosion brought by increased interactions with outsiders
- Land use and compensation disputes (e.g., land resources and power conflict);
- Tensions and conflicts over the awarding of jobs and contracts;
- Increased inequities that risk further marginalizing vulnerable groups; and

- Degraded community relations caused by inadequate communication with communities and stakeholders.

With the implementation of mitigation measures, the magnitude of the residual impact on gender and community relations were assessed as moderate. All identified projects will have similar effects on this VEC as the Project.

Considering that:

- 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.

Cumulative effect is anticipated. The application of mitigation measures outlined in Sections 8.3.14, 8.3.15, and 8.3.16 should ensure that most residual cumulative impacts on gender, and community relations remain of moderate magnitude. These include a Community Engagement Plan, a Code of Conduct for workers and measures favouring women and local employment. Where possible, a regional strategy for interaction with and integration of outsiders including, but not limited to, the standard and specific mitigation measures related to the influx of workers presented in Sections 8.3.14, 8.3.15, and 8.3.16 should be developed in partnership with affected counties to minimize impacts. While the application of the above standard and specific measures will not reduce the consequences for victims of crime and GBV brought by newcomers, they will greatly reduce the risks posed by the different projects. As a result, the residual cumulative impact should be of moderate magnitude. Overall, the residual cumulative impact on community relations and social justice is expected to be **moderate**.

9 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This chapter presents the assessment of the issues likely to arise as a result of implementation of the proposed project and possible mitigation measures. For each issue, the analysis is based on its nature, the predicted impact, extent, duration, intensity and probability, and the stakeholders and/or values affected. In accordance with best practice, the analysis includes issues relating to the project's environmental and social sustainability.

9.1 Mitigation Measures

9.1.1 Pre-Construction Phase

The majority of mitigation measures and in particular mitigations to protect and enhance the physical environment are most effectively incorporated during the design phase. There are five key elements:

- Development of sustainable designs with the lowest possible environmental impact within the constraints of the project funding and the socio-economic setting.
- Incorporate the recommendations and requirements of the ESMP to be an integral part of the Bidding and Contract Documents thereby building in enforceable measures to protect the environmental and social matters throughout the construction phase.
- Development of stakeholder engagement plan or procedures
- Provide adequate grievance redress procedures to address the concerns of local people and stakeholders to ensure satisfactory resolution of any grievance arising from the project.

For each of the identified impacts, mitigation measures have been suggested in accordance with a general rule defining mitigation criteria as:

1. Avoidance of major impacts: major impacts are generally considered unacceptable, ones that would endure in the long-term or extend over a large area;
2. Reduction of major and moderate impacts to as low as reasonably practicable (ALARP) by planning, designing and controlling mitigation measures. This implies that mitigation measures will be applied until the limitations of cost effectiveness and practical application have been reached. The limitations are established by international practice;
3. Implementation of good practices for impacts rated as minor, in order to ensure that impacts are managed within good reason.

There will only be localized short-term impacts during construction due to the implementation of the civil works. Impacts have been addressed at the design stage by choosing engineering solutions that, as far as is possible, minimize the impacts during construction and operational phase. The impacts which could not be eliminated by the design, mostly impacts during construction, will be reduced or eliminated by mitigation and monitoring measures specified in the ESMP.

These construction related impacts can be mitigated by (i) the contractors' work practices, especially those related to maintenance of access, methods of trench excavation, the storage

of construction materials and cleanliness of the work sites; (ii) cooperation by the local authorities with the contractor in terms of traffic management and use of public space and utilities; (iii) project management's strict enforcement of the correct construction practices and standards; (iv) the incorporation of the mitigation measures identified in the ESIA into the bid documents and specifications; (v) public awareness including liaison at ward level shortly in advance of work in each work location; and (vi) close monitoring of the contractor's implementation of the required mitigation measures.

Environmental impacts and proposed mitigation measures during project pre-construction, construction, operation, and decommissioning phases are described in the following sections.

9.2 Environmental And Social Management Plan

Table 9-1: Pre-Construction Phase Environmental and Social Management Plan

Impact Type	Potential Impact	Mitigation Measures	Cost (Kshs)	Responsibility
Pre-Construction Phase				
Displacement Impacts (physical and economic)	- Loss of land -Loss of structures -Loss of crops and trees -Loss of business	Implement RAP (prepared as a separate document) Compensate for loss of assets N/B. RAP report has been prepared and identified a total of 274 Project Affected Households (PAHs) including 1 private land owner and 273 traders (encroachers) on the ROW. The PAHs shall be compensated for loss of land (applicable to private land owner only) and structures for (encroachers). Compensation for loss of income by traders during the construction period caused by disruption.	21,500,557.94	CWWDA

Table 9-2: Construction Phase Environmental and Social Management Plan

Impact Type	Potential Impact	Mitigation Measures	Cost (Kshs)	Responsibility
Construction Phase				
A1: Construction Air Impacts	Impact on sensitive receptors Impact on workers' health and safety Impact on community health and safety Impact on flora and fauna	**A1-1:** Develop a Dust Management Plan; **A1-2:** Record all dust and air quality complaints, identify cause(s), take appropriate measures **A1-3:** Liaise with local communities to forewarn of potentially dusty activities; **A1-4:** Undertake monitoring close to dusty activities, noting that this may be daily visual inspections, or passive/active monitoring **A1-5:** Undertake inspections to ensure compliance with the Dust Management Plan; **A1-6:** Plan potentially dusty activities so that these are located as far from receptors as feasible **A1-7:** Erect solid screens if feasible around stockpiles and concrete batching; **A1-8:** Avoid run off of mud and water and maintain drains in a clean state; **A1-9:** Remove dusty materials form site as soon as possible if not being re-used. If being re-used, cover or vegetate if possible; **A1-10:** Impose speed limits on haul routes and in construction compounds to reduce dust generation; **A1-11:** Minimise drop heights when loading stockpiles or transferring materials; and **A1-12:** Avoid waste or vegetation burning.		Contractor
		For traffic on unpaved roads: **A1-13:** Undertake watering to attenuate dust near sensitive receptors. The duration and frequency of this shall be set out in the Dust Management Plan and shall consider water availability and any stakeholder grievances; and		Contractor

Impact Type	Potential Impact	Mitigation Measures	Cost (Kshs)	Responsibility
		A1-14: 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 earthworks: **A1-15:** Revegetate exposed areas as soon as feasible **A1-16:** Revegetate or cover stockpiles if feasible; **A1-17:** Expose the minimum area required for the works		Contractor
		For track out: **A1-18**: Where track out is onto paved roads, use wet road cleaning methods to remove dirt and mud build up; **A1-19:** Avoid dry sweeping of large areas; and **A1-20:** Where feasible, undertake wheel washing and vehicle clean down prior to accessing public roads.		Contractor
Total			500,000	
A2. Noise and Vibration Impacts	Impact on sensitive receptors Impact on workers' health and safety Impact on community health and safety Impact on fauna	**A2-1:** Siting noisy plant and equipment as far away as possible from NSRs, and use of barriers (e.g. site huts, acoustic sheds or partitions) to reduce the level of construction noise at receptors wherever practicable; **A2-2:** Where practicable noisy equipment shall be orientated to face away from the nearest NSRs; **A2-3:** Working hours for significant noise generating construction work (including works required to upgrade existing access roads or create new ones), shall be daytime only;		Contractor
		A2-4: Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, shall be used, where practicable;		Contractor
		A2-5: Where practicable, stationary equipment shall be located in an acoustically treated enclosure		Contractor
		A2-6: For machines with fitted enclosures, doors and door seals shallbe checked to ensure they are in good working order; also, that the doors close properly against the seals;		Contractor
		A2-7: Throttle settings shall be reduced, and equipment and plant turned off, when not being used; **A2-8:** Equipment shall be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers shall also be checked; and **A2-9:** Fitting of mufflers or silencers of the type recommended by manufacturers		Contractor
Total			200,000	
A3. Soil erosion and contamination impacts	Impacts on water quality (sediment run-off/contamination) leading to	**A3-1:** Vegetation clearing, and topsoil disturbance shall be minimized. **A3-2:** Contour temporary and permanent access roads/laydown areas so as to minimise surface water runoff and erosion; **A3-3:** Sheet erosion of soil shall be prevented where necessary through the use of sandbags, diversion berms, culverts, or other physical means.		Contractor

Impact Type	Potential Impact	Mitigation Measures	Cost (Kshs)	Responsibility
	deterioration of quality. Deteriorated water quality will impact on fauna if consumed. Deteriorated water quality will impact on community health if consumed.	**A3-4:** 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.		
		A3-5: Topsoil shall be evenly spread across the cleared areas when reinstated. **A3-6:** Accelerated erosion from storm events during construction shall be minimised through managing storm water runoff (e.g. velocity control measures).		Contractor
		A3-7: Soil backfilled into excavations shall be replaced in the order of removal in order to preserve the soil profile. Material (e.g. fuel or chemicals).		Contractor
		A3-8: Spread mulch generated from indigenous cleared vegetation across exposed soils after construction.		Contractor
Total			500,000	
A4. Surface Water Quality Impacts	Impacts on water quality (sediment run-off/contamination) leading to deterioration of quality. Deteriorated water quality will impact on fauna if consumed. Deteriorated water quality will impact on community health if consumed.	**A4-1:** Activities shall be conducted >100m away from water bodies, except where crossings are required.		Contractor
		A4-2: All wastewater which may be contaminated with oily substances must be managed in accordance with an appropriate waste management plan and no hydrocarbon-contaminated water may be discharged to the environment;		Contractor
		A4-3: Domestic wastewater shall be treated and disposed of in accordance with an approved waste management plan. Park vehicles preferably on paved platforms		Contractor
Total			100,000	
A5. Impact on Flora	Loss of biodiversity.	**A5-1:** Avoidance of impacts shall be prioritized. , it is strongly recommended to closely/re-route follow the main road along these transmission-line segments. Where impact avoidance is not possible, existing indigenous vegetation must be kept intact, where possible. Vegetation shall be removed only as absolutely necessary.		Contractor

Impact Type	Potential Impact	Mitigation Measures	Cost (Kshs)	Responsibility
		A5-2: Rivers, watercourses and other water bodies shall be kept clear of felled trees, vegetation cuttings and organic waste and debris from clearing;		Contractor
		A5-3: Alien invasive vegetation shall be removed immediately and disposed of properly, at a licensed waste disposal facility as necessary.		Contractor
		A5-4: There shall be no deviation from the access road position without prior discussions with the authorities		Contractor
		A5-5: Rehabilitation of temporary construction sites and pioneer camps (if needed) shall be done as swiftly as possible and always with suitable native grasses and other plants–construction of new camps is unlikely to happen;		Contractor
		A5-6: Materials (e.g. transmission mains and valves) and equipment shall not be delivered to the site prematurely, as this could result in need for laydown or storage areas and additional areas being cleared or affected unnecessarily; and		Contractor
		A5-7: Whenever possible, all damaged areas shall be reinstated and rehabilitated upon completion of the contract to as near pre-construction conditions as possible		Contractor
Total			50,000	
A6. Impact on Fauna	Disturbance due to noise, vibrations and vehicle presence.	**A6-1:** All areas disturbed by construction activities shall be rehabilitated/reinstated;		Contractor
Total			50,000	
A7: Solid and Liquid Waste Impacts	-Impact on storm water quality and thus water quality in the water bodies in project areas -Impact on soil quality -Impact on surface water quality; -Impact on ground water quality; and	**A7-1:** Prepare Waste Management Plan to include: ○ An inventory of the types and quantities of waste to be produced. ○ The most appropriate waste management approach for each type of waste including details on (temporary) storage, transport and final destination of the waste. ○ An assessment of any opportunities for reducing solid waste generation, in particular of hazardous and undesirable (persistent and non-reusable) types of wastes. • The Contractor to maintain records of types, quantities, origin, (temporary) storage, transport, and elimination/reuse of solid waste, and make these available to the works supervisor upon his request, as proof of proper waste management practices. • Any waste including excess soil shall be disposed of at NEMA gazette sites. • Excavated soils shall be reused as much as possible as filling material and shall be		Contractor

Impact Type	Potential Impact	Mitigation Measures	Cost (Kshs)	Responsibility
	-Impact on ecological receptors or human health -Aesthetic quality	contained after excavation. • Provisional material storage on site shall be designed and undertaken in such a way as to ensure that soils and underground water are not polluted. • Use licensed recycling companies to externally recycle, recover or dispose of waste. **A7-2:** Develop and Implement Effluent Waste Management Plan **A7-3:** Workers camp to be connected to sewerage system or construct soak pits **A7-4:** Mobile toilets to be made available at constrction sites		
Total			100,000	
A8. Access to Infrastructure and Services	-Disruption of transit routes -Disruption of normal traffic operations -Wastes from the camp site could be significant and overburden the existing wastes disposal facilities in the area	**A8-1:** Methods shall be implemented to maintain open, clear and transparent communication with the local communities regarding the use of local infrastructures by the Project throughout the different phases. **A8-2:** Engagement with the relevant authorities is recommended in order to avoid damage to common property and minimize access disruption to education and healthcare facilities **A8-3**: Community Grievance Mechanism shall be implemented. **A8-4:** A Traffic Management Plan shall be issued before earth movements and construction start in order to minimize traffic disruptions **A8-5:** Where temporary closure of road is required, alternative access to property shall be ensured and local solutions including diversions shall be implemented to ensure uninterrupted mobility.		Contractor
A9: Landscape & Visual ammenities risks	-Impacts on aesthetics of the surroundings with the possibility to affect the neighbouring residents.	**A9-1:** Any excavated areas shall be backfilled, landscaped and revegetated; **A9-2**: No debris or waste materials shall be left at the work sites, good housekeeping on site to avoid litter and minimise waste **A9-3:** Night lighting of sites shall be minimized within requirements of safety and efficiency; **A9-4:** Ongoing rehabilitation of cleared areas to minimise visual scarring and maintenance clearing shall be kept to the absolute minimum and shall not extend beyond the corridor;		Contractor
A10: Worker's Health and Safety and Workers Management	-Workers are likely to be exposed to work related risks during the construction phase of the project.	**A10-1**: CWWDAshalld evelop a Human Resources Policy, which shall 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
		A10-2: CWWDA shall require its contractors and subcontractors to put in place policies in line with national legislation and applicable international legislation and CWWDA Code of Conduct and Policies.		Contractor

Impact Type	Potential Impact	Mitigation Measures	Cost (Kshs)	Responsibility
		The Code of Conduct to include guidelines on worker –community interactions and shall provide training on the worker code of conduct to all employees including contractors and subcontractors as part of the induction process. The Code of Conduct to include guidelines on worker –community interactions and shall provide training on the worker code of conduct to all employees including contractors and subcontractors and truck drivers as part of the induction process		
		A10-3: CWWDA shall establish contractual clauses to be embedded in the contracts of the EPC and all sub-contractors that require adherence to Kenyan law and international standards to be upheld related to worker rights and providing the contractor and CWWDA with the right of audit.		Contractor
		A10-4: Pre-employment medical assessments shall 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 a pre-employment medical assessment include a safer working environment, reduction in workplace injuries, minimised downtime, matching the capacity of the employee with the role, and overall recruitment cost and risk reduction. **A11-5:** CWWDA shall 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. **A11-6**: CWWDA shall implement regular health and safety checks and audits of Workers, contractors and subcontractors and implementing sanctions in case of breaches of nationals **A11-7:** CWWDA shall develop and implement a Workers Grievance Mechanism for the Project workforce including contractors and subcontractor's 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. **A11-8:** CWWDA shall 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. **A11-:9** CWWDA shall ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents. **A11-10:** CWWDA shall ensure that adequate clean water, adequate food and access to medical care is provided to all workers on the worksite and at accommodation.		Contractor
Total			800,000	
A11: Community Health and Safety Impacts	-Increased noise decreased air quality, inappropriate waste	**A11-1:** CWWDA shall develop and monitor the implementation of a Community Health and Safety Management Plan which shall include the following measures: **A12-2:** Ensure all workers including contractors and subcontractors undergo pre-employment screening and regular health screening including voluntary screening for STDs.	500,000	Contractor

Impact Type	Potential Impact	Mitigation Measures	Cost (Kshs)	Responsibility
	handling or disposal, and accidental leaks and spills, debris and movement of heavy equipment may pose a safety risk to the general public. -Potential impacts on community safety, in particular road accidents, trespass on the sites, and demining activities potentially resulting in accidents leading to injuries or fatalities. -Environmental health: changes to the environment due to increased noise and vibrations, decreased air quality and, inadequate management of waste. -Impact from workers presence and potential interaction with local populations	**A11-3:** Ensure all workers including contractors and subcontractors receive education around transmission routes and symptoms of communicable diseases of concern and STDs. **A11-4:** Provide access to health care for those injured by its activities. **A11-5:** Ensure that work sites are fenced and that signs are put up around work fronts and construction sites advising people of the risks associated with trespass. When work fronts are less than 100 metres from a community or house, employ security guards from the local community to prevent trespass. **A11-6:** Undertake a programme of stakeholder engagement and consultation to educate local communities of the risks of trespassing onto sites, the meaning of signs, and the dangers of playing on or near equipment or entering fenced areas. Special attention to be paid in primary and secondary schools along the transmission routes		
		A11-7: CWWDA shall develop Emergency Response Plans (ERPs) in cooperation with local emergency authorities and hospitals. **A11-8:** CWWDA shall provide primary health care and first aid at construction camp sites to avoid pressure on local healthcare infrastructures. **A11-9:** CWWDA shall implement a Community Grievance Mechanism. **A11-10:** CWWDA shall develop and implement a Traffic Management Plan covering aspect 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
A12: Gender-Based Violence at the community level	-Gender-based violence at the community level	**A12**.1: Develop and implement GBV Action Plan **A12-2:** Community sensitization including disseminating information on GBV (SEA and SH) risks and management protocols. **A12-3:** Implementing a GBV-SEA/SH management plan to mitigate and respond to GBV cases,	200,000	Contractor CSOs (relevant CBOs, NGOs)

Impact Type	Potential Impact	Mitigation Measures	Cost (Kshs)	Responsibility
	-Forced Early Marriages -Sexual Exploitation and Abuse -Transactional sex. -Shift in power dynamics in the community or family. -Abusive behaviour among project-related staff	including provision of referral pathways for survivors, establishment of a GRM that is sensitive and confidential (survivor centred). **N/B: CSOs to be involved in advocacy, awareness creation, sensitisation, support to GBV Victims etc**		
A13: Violation of children rights by contractor and labour force on site	-Violation of children rights by contractor and labour force on site	**A13-1:** Implement Code of Conduct **A13-**2: Ensure all workers present national identification documents to confirm their age in order to not employ minors (under 18 years of age)	No cost	Contractor
A14: Land Acquisition and Involuntary Displacement Impacts	-Temporary loss of Land, livelihoods and household income as a result of temporary land take. -Displacement of physical structures and physical resettlement.	**A14-1:** Preparation of RAP and implementation before commencing works	RAP Cost	CWWDA
A15: Archaeology and Cultural Heritage Impacts	-Destruction of cultural sites	**A15-1:** Consult community when any community issue arises in order to engage traditional forms of community leadership. **A15-2:** Work with local community representatives to develop cultural awareness materials (that shall cover key issues including the location and importance of all local cultural sites and other cultural sensitivities (graves). **A15-3:** Establish a grievance procedure to ensure community concerns are addressed. **A15-4:** Develop and implement a chance find procedure based on procedues provided as annex B of this report) which shall detail the appropriate course of action that must be followed for any relevant cultural heritage discoveries.	Cost to be determined based on chance find	Contractor
A16: Unplanned Events	-Impacts to soil and surface water from spill events	**A16-1:** Develop a detailed Spill Response Plan (SRP) which includes community notifications of any significant spills that have the potential to affect communities.	500,000	Contractor

Impact Type	Potential Impact	Mitigation Measures	Cost (Kshs)	Responsibility
		A16-2: Refuelling of equipment and vehicles shall be carried out in designated areas on hard standing ground to prevent seepage of any spillages to ground. **A16-3:** Hazardous material storage shall be on hard standing and impermeable surface and the bulk storage facility shall be bunded. **A16-4:** Hydrocarbon spill clean-up kits shall be available at all locations where refuelling or maintenance of vehicles and equipment is done, and responsible people shall be trained in the use thereof.		
In-Migration	HIV/AIDS/STI spread Cultural conflicts GB/SEA	**A17-1:**Develop and implement Labour Influx Management Plan	100,000	Contractor

Table 9-3: Operation Phase Environmental and Social Management Plan

Phase/ Impact Type	Potential Impact	Mitigation Measures	Cost	Responsibility
Operations and Maintenance Phase				
B1. Air pollution Impacts	Impact on sensitive receptors Impact on workers' health and safety Impact on community health and safety Impact on flora and fauna	**B1-1:** Develop and implement a Dust Management Plan; **B1-2:** Record all dust and air quality complaints, identify cause (s), take appropriate measures **B1-3:** Liaise with local communities to forewarn of potentially dusty activities; **B1-4:** Undertake monitoring close to dusty activities, noting that this may be daily visual inspections, or passive/active monitoring **B1-5:** Undertake inspections to ensure compliance with the Dust Management Plan; **B1-6:** Plan potentially dusty activities so that these are located as far from receptors as feasible **B1-7:** Remove dusty materials form site as soon as possible if not being re-used.; **B1-8:** Impose speed limits to reduce dust generation during maintenance operations; **B1-9:** Avoid waste or vegetation burning.		CWWDA
		For traffic on unpaved roads: **B1-10:** Undertake watering to attenuate dust near sensitive receptors. The duration and frequency of this shall be set out in the Dust Management Plan and shall consider water availability and any stakeholder grievances; and		CWWDA
		For earthworks: **B1-15:** Revegetate exposed areas as soon as feasible **B1-16:** Revegetate or cover stockpiles if feasible; **B1-17:** Expose the minimum area required for the works and undertake; and exposure on a staged basis to minimise dust blow.		CWWDA
Total			200,000	
B2. Noise Emissions and Vibration Impacts	Intermittent noise from equipments can generate noise	**B2-1:** Siting noisy plant and equipment as far away as possible from NSRs to reduce the level of construction noise at receptors wherever practicable; **B2-2:** Where practicable noisy equipment shall be orientated to face away from the nearest NSRs; **B2-3:** Working hours for significant noise generating construction work (including works required to upgrade existing access roads or create new ones), shall be daytime only;		CWWDA

Phase/ Impact Type	Potential Impact	Mitigation Measures	Cost	Responsibility
		B2-4: Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, shallbe used, where practicable;		CWWDA
		B2-5: Where practicable, stationary equipment shall be located in an acoustically treated enclosure		CWWDA
		B2-6: For machines with fitted enclosures, doors and door seals shall be checked to ensure they are in good working order; also, that the doors close properly against the seals;		CWWDA
		B2-7: Throttle settings shall be reduced, and equipment and plant turned off, when not being used; **B2-8:** Equipment shall be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers shall also be checked; and **B2-9:** Fitting of mufflers or silencers of the type recommended by manufacturers.		CWWDA
Total			100,000	
B3. Soil erosion and contamination impacts	~ Minimal or no soil erosion	**B3-1:** Channel water from wash out valves into the natural drains **B3-2:** Maintan the storm water cut-off drains and scour/overflow drains.	100,000	CWWDA
B4. Surface Water Quality Impacts	-Minimal or no water pollution	**B4-1:** Activities shall be conducted >100m away from water bodies, except where crossings are required.	100,000	CWWDA
		B4-2: All wastewater which may be contaminated with oily substances must be managed in accordance with an appropriate waste management plan and no hydrocarbon-contaminated water may be discharged to the environment. **B4-3:** Connect staff housing to sewerage system for effluent management/construct septic tanks for effluent management in absence of sewerage system.		
B5. Impact on Flora and Vegetation	-No Large impact on existing flora and vegetation.	**B5-1:** Avoidance of impacts shall be prioritized. It is strongly recommended to closely/re-route follow the main road along these transmission-line segments. Where impact avoidance is not possible, existing indigenous vegetation must be kept intact, where possible. Vegetation shall be removed only as absolutely necessary.	100,000	CWWDA

Phase/ Impact Type	Potential Impact	Mitigation Measures	Cost	Responsibility
		B5-2: Materials and equipment shall not be delivered to the site prematurely, as this could result in need for laydown or storage areas and additional areas being cleared or affected unnecessarily **B5-3:** Whenever possible, all damaged areas shall be reinstated and rehabilitated upon completion of the contract to as near pre-construction conditions as possible.		
B6: Solid and Liquid Waste Impacts	Minimal or no solid or liquid waste	**B6-1:** Implement Solid and Effluent Waste Management Plan including: • Provision of waste receptacles at the offices • Waste segregation, recycling and re-use at the offices • Engaging NEMA licensed waste handler to collect, transport and dispose wastes • Ensure soak pits or connection to sewerline for handling human waste at the offices/reservoir sites **B6-2:** Construct storm water drainages in sections with wash out valves or ensure wash out valves chanell flush water into existing storm water drainage systems. **B6-3:** Construct storm water cut-off drains and scour/overflow drains have been provided at the reservoir sites to prevent erosion of embankments and/or to prevent storm water from flooding the site and compromising the infrastructure.	500,000	CWWDA
B7: Landscape & visual ammenities risks	Impacts on aesthetics of the surroundings with the possibility to affect the neighbouring residents.	**B7-1:** Ongoing rehabilitation of cleared areas to minimise visual scarring and maintenance clearing shall be kept to the absolute minimum and shall not extend beyond the corridor.	20,000	CWWDA

B8: Worker's Health and Safety and Workers Management	Potential impacts to workers health and safety
	-respect for labour rights during construction
		B8-1: Develop and implement a Worker's Health and Safety Management System covering all contractors and subcontractors including the following measures:
		• HR Policy in line with Local labour laws and ILO standards
		  ○ Training on H&S Risks
		  ○ H&S Audits for workers
		  ○ Workers Grievance Mechanism
		  ○ Incident and Accident Reporting
		• Implement Code of conduct to regulate behaviour
			50,000	CWWDA

Phase/ Impact Type	Potential Impact	Mitigation Measures	Cost	Responsibility
		• Access to clean water o Traffic Management Plan o Vehicle Safety o Drug and alcohol use o Rest periods o Traffic safety o Accident Reporting Non-Discrimination on basis of gender, marital status age, religion or sexual orientation		
B9: Community Health and Safety Impacts		**B9-1:** CWWDA shall develop and monitor the implementation of a Community Health and Safety Management Plan which shall include the following measures: • Undertake a programme of stakeholder engagement and consultation to educate local communities of the risks of trespassing onto sites, the meaning of signs, and the dangers of playing on or near equipment or entering fenced areas. Special attention to be paid in primary and secondary schools along the transmission routes. **B9-2:** CWWDA shall develop Emergency Response Plan (ERP) in cooperation with local emergency authorities and hospitals.	500,000	CWWDA

Table 9-4: Environmental and Social Monitoring Indicators

Project Activity/Aspect	Impact/Effect	Monitoring Indicator	Institutional Responsibility	
			Monitoring Responsibility	Frequency
O. General	**A-1** Planning	• Workforce briefed about the relevant environmental and social issues, including pollution control and site management	CWWDA	Continous
	A-2 Implementation Oversight Capacity	Prescence of: • EHS Manager • Environmental Officers • Social Officers • Liaison Officers	CWWDA	Continous

Project Activity/Aspect	Impact/Effect	Monitoring Indicator	Institutional Responsibility	
			Monitoring Responsibility	Frequency
		• Health and Safety Officer		
	A-3 Site Implementation Capacity	• Site EHS Officer	Contractor	As per schedule

P. Land Acquisition	**B-1** Land will be used for laying of pipeleines and other activities etc.
	
	(Loss of land and Livelihoods. To be compensated.
		• Development/Disclosure of RAP
		• Implementation of RAP
		• Development/Implementation of GRM
		• Development/Implementation of LRP
		  ○ Landowners informed about compensation package
		  ○ Number of PAPs receiving compensation
		  ○ Number of restored livelihoods
		  ○ Number of PAPs completing Livelihood restoration training courses
		  ○ Number of Grievances received/resolved
			CWWDA/NLC	As per RAP Schedule

	B-2 Crop/Plant loss during temporary loss of land	• Use of third party independent valuation to define replacement value		• Prior to land acquisition
	B-3 Communication and compensation *(to be communicated during negotiation)*	• Liaison officer to prepare basis of calculation to estimate the rate for different crops and communicate the same to affected PAPs		
	B-4 Damage to community and private/individual property during construction activities	• The grievance redress system shall closely monitor activities for such incidences		
Q. Labour Influx	**C-1** Higher rates of violence, injury **C-2** Alcohol and drug consumption and **C-3** Sexually transmitted diseases in the local population. **C-4** Social conflicts within and between communities	Development/Implementation of: • HR Policy • Labour influx plan Indicators	HSE Manager Human Resource Manager Contractor/CWWDA	• Prior to construction commencing for Local Content and Procurement Plan. • Continuous during construction phase for

Project Activity/Aspect	Impact/Effect	Monitoring Indicator	Institutional Responsibility	
			Monitoring Responsibility	Frequency
		• HR records on the percentage of local versus non-local employment. • Number/attendance records of Sensitization meetings held on GBV, SEA, HIV/AIDS • Review of training attendance records of capacity enhancement and transfer of knowledge that local personnel have received. • Code of conduct included in contracts • % of local workers recruited		employment and procurement-related measures. • Quarterly for training-related measures.
R. Air Quality/ Atmospheric Conditions	**D-1** Dust Emissions associated with construction activities	-Record of repairs -Fuels and lubricants conforming to specifications -PPEs Distribution list/stores, percentage of workers using nose and ear masks • Complaints registered over dust nuisance • Site conditions (from visual inspections)	Contractor/HSE	• Weekly throughout the construction phase
S. Noise	**E-1** Noise from construction activities (*to be managed by equipment choice and arrangement of construction activities)*	• Complaints registered over noise nuisance -Noise making machines/equipment fitted with mufflers -Record of noise measurements -Record of vehicle and equipment maintenance PPEs Distribution list/stores, percentage of workers using ear plugs.	Contractor	• Daily in construction sites close to sensitive receptors

Project Activity/Aspect	Impact/Effect	Monitoring Indicator	Institutional Responsibility	
			Monitoring Responsibility	Frequency
T. Soils	**F-1** Dumping of construction material outside the project construction footprint **F-2** Erosion and compaction **F-3** Contamination due to spill of civil construction material	• Visual checks at construction site • Visual inspection during casting • Stockpiles of topsoil • Written down soil protection measures and record of implementation • Monitoring reports on parking of vehicles and status of fuel storages	Contractor	• At least once per construction site
U. Ecology	**G-1** Disruption to existing flora and fauna **G-2** Loss of Vegetation **G-3** Disturbance to fauna due to movement in forest areas	• Sensitization trainings to worker on local ecology and extent of care • Number of revegetated areas. • Percentage area of site cleared vs. remaining un-cleared land • Disturbed sites restored after well completion	Contractor	• Continuous
V. Waste	**H-1** Accumulation of waste on site causing nuisances such as odor, pest control problems and general litter.	• Construction Waste Management Plan • Written down Solid Waste Management Plan (SWMP) and implementation schedule • Records of types of wastes generated, transport and delivery to designated disposal sites • Routine weekly checks of waste management arrangements shall be undertaken • Status of housekeeping on site • Waste tracking records • Agreement/contracts with licensed waste handling agencies.	Contractor	• Continuous
W. Traffic and Transport	Increase in traffic	• Development/implementation of traffic management plan • Number of traffic incidents recorded • -Demarcated work sites and signals • Security guards to restrict access	Contractor	• Continuous

Project Activity/Aspect	Impact/Effect	Monitoring Indicator	Institutional Responsibility	
			Monitoring Responsibility	Frequency
		● Sensitization reports		
X. Landscape and Visual Ammenities	**K-1** Visual scarring of the landscape	Disturbed sites restored after well completion	Contractor	Continuous throughout the construction phase
Y. Workers Heath, Safety and Labour Rights	Workers health and safety Respect for labour rights	● Worker Health and Safety Management System in place ● Human Resources Policy ● Traffic Management Plan ● Verify contractual clauses of Contractor and all sub-contractors requiring adherence to Kenya law and international standards. ● Records of incidents and accidents ● Record on training sessions and attendance on health and safety measures ● Record of lessons learned to minimize occupational health and safety ● Code of Conduct document ● Availability of protective wear, e.g., Gloves, overalls, masks, helmets etc.	Contractor	● Continuous
Z. Community Impacts	**L-1** Labour Influx *(Health impacts including risks of STDs, HIV/AIDS)* **L-2** Community expectation for local benefits	● Number of meetings held ● Attendance records of sensitization meetings held on GBV, SEA, HIV/AIDS ● HR records on the percentage of local versus non-local employment ● Code of conduct included in contracts	Contractor	Continuous throughout the construction phase
	L-3 Violence against Children	● Policies against VAC in place ● HR Policy ● Records of employees with National ID card indicated and capture chronological age.	Contractor	

Project Activity/Aspect	Impact/Effect	Monitoring Indicator	Institutional Responsibility	
			Monitoring Responsibility	Frequency
		• Cases received, resolved with time allotted, referred out, escalated, etc.		
	L-4 Gender Based Violence and Domestic Violence	• Policies against GBV in place • HR Policy • Attendance records of Sensitization meetings held on GBV • Presence of a dedicated GRM for uptake of complaints/ Grieviances • Cases received, resolved with time allotted, referred out, escalated, etc.	Contractor Local CBO/NGO	Continuous throughout the construction phase
AA. Cultural Heritage	**M-1** Cultural and religious sensitivities maybe impacted by project	• Chance find procedure • Records of training on chance find procedures	Contractor	Continuous throughout the construction phase
BB. Local amenities and infrastructure	**N-1** Pressure to local infrastructure from use of local resources	• Grievance redress process shall closely monitor construction activities for such incidences	CWWDA Liaison Officer Contractor Local representative	Continuous throughout the construction phase

9.3 Construction Environment and Social Management Plan

For an effective integration of environmental and social safeguards into the project implementation the Contractor shall need to adopt the ESMP in this report and prepare a comprehensive Construction Environment and Social Management Plan (C-ESMP) that shall provide the key reference point for compliance. The environmental supervision shallalso adopt the C-ESMP. C-ESMP is an upgraded ESMP illustrating realities of the project works to be prepared by the Contractor. The Contractor is expected to finalize the Work Plan and upon approval, list the works items and for each item present practical actions that shall be undertaken to realize achievement of the ESMP. The actions on works items shall address environmental and social aspects associated with the works and in line with guidelines from the ESMP. Based on these ESMP outline, the Contractor shall be instructed to develop a C-ESMP and submit these plans to the CWWDA. The requirement to develop C-ESMP shall be included in the contracts and linked to sanctions for non-compliance. Additionally, no works shall commence in areas where RAP has not been implemented and that the contractor shall commit to compensate any damages caused beyond the designated construction corridor by virtue of his working.

9.4 CWWDA Project Management Team

The Project shall be implemented by CWWDA which has a long experience of implementing World Bank financed projects under the safeguards policies. CWWDA has experienced environmental and social safeguards specialist on staff. The project implementation arrangements have been established and the proponent has appointed the CWWDA project implementation team including;

- Project Coordinator/Engineer
- Environmentalist
- Sociologist

The core functions of the team shall be to coordinate and facilitate oversight for technical, environmental and social safeguards, health and safety and social risks supervision.

9.5 Project Supervision Engineer

The Project Supervision Engineer shall be required to recruit a qualified Environmental and Social Expert who shall be charged with the responsibilities of supervision, review of site reports, preparation of monthly progress reports, prepare and issue appropriate instructions to the Contractor and monitor ESMP implementation.

9.6 Contractor

The Contractor shall ensure that the established mitigation measures are integrated and implemented throughout the project works as per the C-ESMP. The Contractor shall internalize the ESMP/C-ESMP, prepare monthly progress reports and implement instructions issued by the Supervision Consultant. The Contractor, therefore, shall engage qualified Environmentalist and Social Experts on full time basis to interpret the C-ESMP and advice on the implementation of the same, as well to the Counterpart Personnel for the Supervision Expert. The full Contractor's team shall comprise of key staff cadres as shall be specified in the Bidding Document. An environmental and social completion audit report shall be prepared by the contractor at the completion of the construction of the project

before hand over which will ascertain the extent to which the contractor complied with the ESMP/C-ESMP and that no environmental and social liabilities are existing prior to handover. The PIU shall prepare an environmental and social audit in the first year of operation in accordance with the Environmental Audit regulations of Kenya. Contractor shall not acess the sites and take possession until PAPs are compensated as per the RAP. Further, any displacement/disturbance or destruction of property by contractor outside of the tranmsisison line corridor shall be compensated by contractor (at contractors) cost.

9.7 National Environment Management Authority

The National Environment Management Authority (NEMA) is responsible for ensuring environmental compliance in the country and has offices in Mombasa and Kwale and Kilifi Counties with staffing who shall further ensure that the ESMP is implemented as part of their mandate, functions and responsibilities. NEMA shall undertake surveillance on the project implementation and review compliance performance based on the supervision monitoring reports. CWWDA shall notify the Bank of any improvement orders issued by NEMA following surveillance.

9.8 Management and Monitoring

9.8.1.1 Management and Monitoring Plans

The ESMP has identified an additional plan that shall be prepared by the procured contractor with explicity monitoring indicators prior to construction commencing on pipeline transmission:

- Construction Environmental and Social Management Plan (C-ESMP) including monitoring and monitoring indicators.

CWWDA shall delegate certain responsibility but retain oversight and supervision role to construction contractors and supervising engineers as specified in this ESIA/ESMP section that highlights the roles of the contractors. During this phase CWWDA shall manage its contractors to ensure that this ESMP is implemented and monitored effectively through contractual mechanisms and regular direct oversight. As a contractual requirement, the contractors shall be required to demonstrate compliance of their activities against the ESMP and report on the C-ESMP implementation.

The Project's ESMP and related documentation shallbe the main contractual documentation to which the contractor (s) shall be bound to. Contractors shallbe required to develop their own management plans which show how they shall comply with these environmental and social requirements.

In this way, the ESMP shall be implemented and controlled using both CWWDA and the contractor management systems. The contractor management systems shall therefore:

- Provide the framework that regulates their activities;
- Define responsibilities and reporting relationships for expediting, mitigation and monitoring actions detailed in the ESMP; and
- Specify the mechanisms for inspecting and auditing to ensure that the agreed actions are implemented.

Contractors shall be required to self-monitor against their plan and compliance with the plan shalll be routinely monitored by CWWDA directly or by third parties. Contractors shall be required to submit regular reports of monitoring activities and the Project shall review these on a regular basis. CWWDA is ultimately responsible for the management and supervision of all Project activities and shall have principal responsibility for implementing this ESMP and the mitigation measures.

10 GRIEVANCE MANAGEMENT

Grievance redressal is a critical component of effective ESMP implementation. The purpose of GRM is to provide a forum to the internal and external stakeholders to voice their concerns, queries and issues with the project. Such a mechanism would provide the stakeholders with one project personnel and various channels through which their queries shall be channeled and will ensure timely responses to each query.

This will allow for trust to be built amongst the stakeholders and prevent the culmination of small issues into major community unrest. The GRM shall be accessible and understandable for all stakeholders in the project and for the entire project life. The GRM shall be communicated to all relevant stakeholders and shall also be applicable for any contractor that shall occupy and/or use land during the construction and operations phase.

WBG operational policies require grievance mechanisms to provide a structured way of receiving and resolving grievances. Complaints should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities and is at no cost and without retribution. The mechanism should be appropriate to the scale of impacts and risks presented by a project and beneficial for both the company and stakeholders. The mechanism must not impede access to other judicial or administrative remedies.

WBG standards require Grievance Mechanisms to provide a structured way of receiving and resolving grievances. Complaints should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities and is at no cost and without retribution. The mechanism should be appropriate to the scale of impacts and risks presented by a project and beneficial for both the company and stakeholders. The mechanism must not impede access to other judicial or administrative remedies. This section contains the following:

- Grievance definition and categories and GRM principles; and
- The process of receiving, documenting, addressing and closing grievances.

The GRM will be vital in addressing grievances between the contractor and the local communities (external) that are related to environmental and social aspects of the project including health and safety. There shall also be a separate GRM established by the contractor to address grievances between the workers and the contractor (internal). The GRM shall be accessible and understandable for all stakeholders in the project and for the entire project life. The GRM shall be communicated to all relevant stakeholders and shall also be applicable for any contractor that shall occupy and/or use land during the construction and operations phase.

There shall be a separate mechanism within the GRM that will be aimed at ensuring safely and confidentially while receiving complaints related to SEA and to GBV at the community level through a focal point system (CWWDA) as well as anonymous complaints mechanism managed by the CLO.

10.1 Grievance Definition/Categories

As stated earlier, a grievance is a concern or complaint raised by an individual or a group within communities affected by company operations. Both concerns and complaints can result from either real or perceived impacts of a company's operations and may be filed in the same manner and handled with the same procedure. Grievances may take the form of specific complaints for actual damages or injury, general concerns about project activities, incidents and impacts or perceived impacts. Based on the understanding of the project area and the stakeholders, an indicative list of the types of grievances have been identified for the project, as can be seen below: -

Internal Grievances: Grievances from Employees (including both direct and indirect employees, including local workers and migrant workers through contractors):

- Complaints pertaining to amount of wage, salary, other remuneration or benefits as per Company's Human Resource policy;
- Gender discrimination;
- Sexual harassment;
- Sexual exploitation and abuse by project workers against community members;
- Violence against children;
- Gender-based violence;
- Issues related to workers organization;
- Health and Safety issues; and
- Extended working hours.

External Grievances: Grievances from community members:

- Issues related to sexual exploitation and abuse;
- Issues related to gender-based violence at the community-level;
- Issues related to child labour and protection;
- Issues related to transportation and traffic;
- Increase in environment pollution;
- Impact on community health;
- Disturbances to locals due to influx of migrant workers in the area;
- Issues arising out of sharing of employment and business opportunity; and
- Concerns over the impact on local cultures and customs.

The list of grievances shall be regularly updated as and when the new one arises.

10.2 External Grievance Mechanism

During consultations, it was revealed that the client shall hire a Community Liaison Officer (CLO) who shall serve to meet all community liaison responsibilities. He/she shallalso be tasked with the responsibility of ensuring the effectiveness in implementation of the grievance mechanism. The contractors shall also be required to recruit CLOs to handle project related grievances (the bidding documents will reflect these requirements). The grievance mechanism shall be advertised and announced to affected stakeholders so that they are aware of their rights to submit comments and how to go about it. The grievance mechanism shall be founded on the following principles:

Responsibilities shall be adequately assigned: A responsible person or team shall be constituted and mandated to organise the resolution of grievances. This will enable the system run without undue impediments.

- The process shall be accorded due importance: It is important for affected communities and other stakeholder groups seeking to have their complaints resolved, to perceive the grievance management process as transparent and fair. The CWWDA grievance management process will enhance outcomes and give people satisfaction that their complaints have been heard, even if the outcome is less than optimal.
- The grievance procedures shall be readily understandable, accessible and culturally appropriated by the local population. From the outset, clarification shall be made on who is expected to use this procedure. The people shall be assured that there shall be neither costs nor retribution associated with lodging a grievance. The entire process (from how a complaint is received and reviewed, through to how decisions are made and what possibilities may exist for appeal) shall be made as transparent as possible through good communication.
- The Mechanism shallbe scaled as needed for the Project: The CWWDA grievance mechanisms shall be designed to fit the context and needs of the project. As much as possible, it shall have relatively simple means of addressing complaints, such as through community meetings, community liaison personnel and suggestion boxes allowing for anonymity. It may also need a more formalized process and mechanism, and a higher level of dedicated resources for receiving, recording, tracking, and resolving complaints. The grievance mechanisms shall not be taken as a substitute for community engagement process or vice-versa. The two are complementary and shall be made mutually reinforcing. Not all grievances shall be handled in the same way. CWWDA shall consider creating different levels of redress within the grievance mechanism that correspond to the scale and seriousness of the complaint.
- The process shall be documented and publicized: The process shall be put in writing and publicized. CWWDA recognizes that the GRM cannot be effective if nobody knows about it. Thus, the grievance procedures shall be put into writing, publicized, and explained to relevant stakeholder groups. The people shall be informed on where to go and whom to talk to if they have a complaint and understand what the process shall be for handling it. As with all information, it shall be provided in a format and language readily understandable to the local population and/or communicated orally where it's established that literacy levels are low. It shall not be overly complicated to use nor shall it require legal counsel to complete.
- The process shall be made accessible: Projects that make it easy for people to raise concerns and feel confident that these shall be heard and acted upon can reap the benefits of both a good reputation and better community relations. One of the best ways to achieve this is to localize your points of contact. Hire people with the right skills, training, and disposition for community liaison work and get them into the field as quickly as possible. Maintaining a regular presence in the local communities greatly helps to personalize the relationship with the company and engender trust. Talking with a familiar face who comes to the village regularly, or lives nearby, creates an informal atmosphere in which grievances can be aired and

sorted out, or referred up the chain of command. This is usually more convenient and less intimidating to people than having to travel distances to the company offices during business hours to file a formal complaint.

- Response time shall be defined and transparency upheld: CWWDA shall publicly commit to a certain time frame in which all recorded complaints shall be responded to and ensure this response time is enforced. This will help allay frustration by letting people know when they can expect to be contacted by CWWDA personnel and/or receive a response to their complaint. Combining this with a transparent process by which stakeholders can understand how decisions are reached will inspire confidence in the CWWDA system. During critical times such as construction, there shall be immediate responses to time-sensitive complaints. A related issue is making sure that the community liaison officer has the authority to resolve basic complaints herself, as well as a direct reporting line to senior managers if the issue is more serious or costly to address.
- Good record-keeping and feedback: a grievance logbook shall be kept where necessary, and a sophisticated database will be maintained where required. Written records of all complaints shall be kept as this is critical for effective grievance management. The record shall contain the name of the individual or organization; the date and nature of the complaint; any follow-up actions taken; the final result; and how and when this decision was communicated to the complainant. Overly personal data such as national identity and phone numbers will be optional and kept confidential unless required to disclose to authorities. In addition to informing the complainant of the outcome (in writing where appropriate), as part of the broader community engagement process CWWDA shall report back periodically to communities and other stakeholder groups as to how the company has been responding to the grievances it has received.
- There shall be a separate reporting mechanism for GBV, SEA and SH cases that are discrete and anonymous. The liaison officer shall be the focal point and will establish the system to handle these complaints that shall include reference to confidentiality, safety and survivor-centered approach. All registration of the data shall be confidential and anonymized.
- Access to legal remedies shall not be impeded: If the project is unable to resolve a complaint, it may be appropriate to enable complainants to have recourse to external experts. These may include public defenders, legal advisors or NGOs. The client may find that it can work in collaboration with these third parties and affected communities to find successful resolution of the issues. However, this is not always possible, and situations may arise where complainants shall choose to pursue legal recourse. In this case, CWWDA shall not impede access to these mechanisms.

Table 10-1: Sample Grievance Recording Form

GRIEVANCE REGISTRATION	
CASE No.	**DATE**
Name	
Department/Contractor Name	
Phone Number	

Details of Grievance	
Name of Person Recording Grievance	
Designation of Person Recording Grievance	
Proposed Date of Response to Grievance	
Signature of Recording Person	Signature of Complainant
GRIEVANCE REDRESS RESPONSE	
Date of Redress	
Decision of CLO (Give full details)	

10.3 Maintaining a Grievance Register

Each grievance thus received, shall be recorded in a grievance register. The format for the grievance register shall be as follows.

Table 10-2: Sample Grievance Recording Form

Date	GR #	Name and contact of Grievant	Ward/Village	Grievance Details	Concerned Department	Name of Recording Person	Present Status	Remarks

This grievance register shall be updated at each stage of the grievance redressal. Once the grievance is recorded in the register by principal topic, a preliminary analysis shall be undertaken by the Community Liaison Officer to ensure that the grievance is within the scope of the GRM.

10.4 External Grievance Mechanism

The process to be followed for the redressal of the external stakeholder grievances is summarized below.

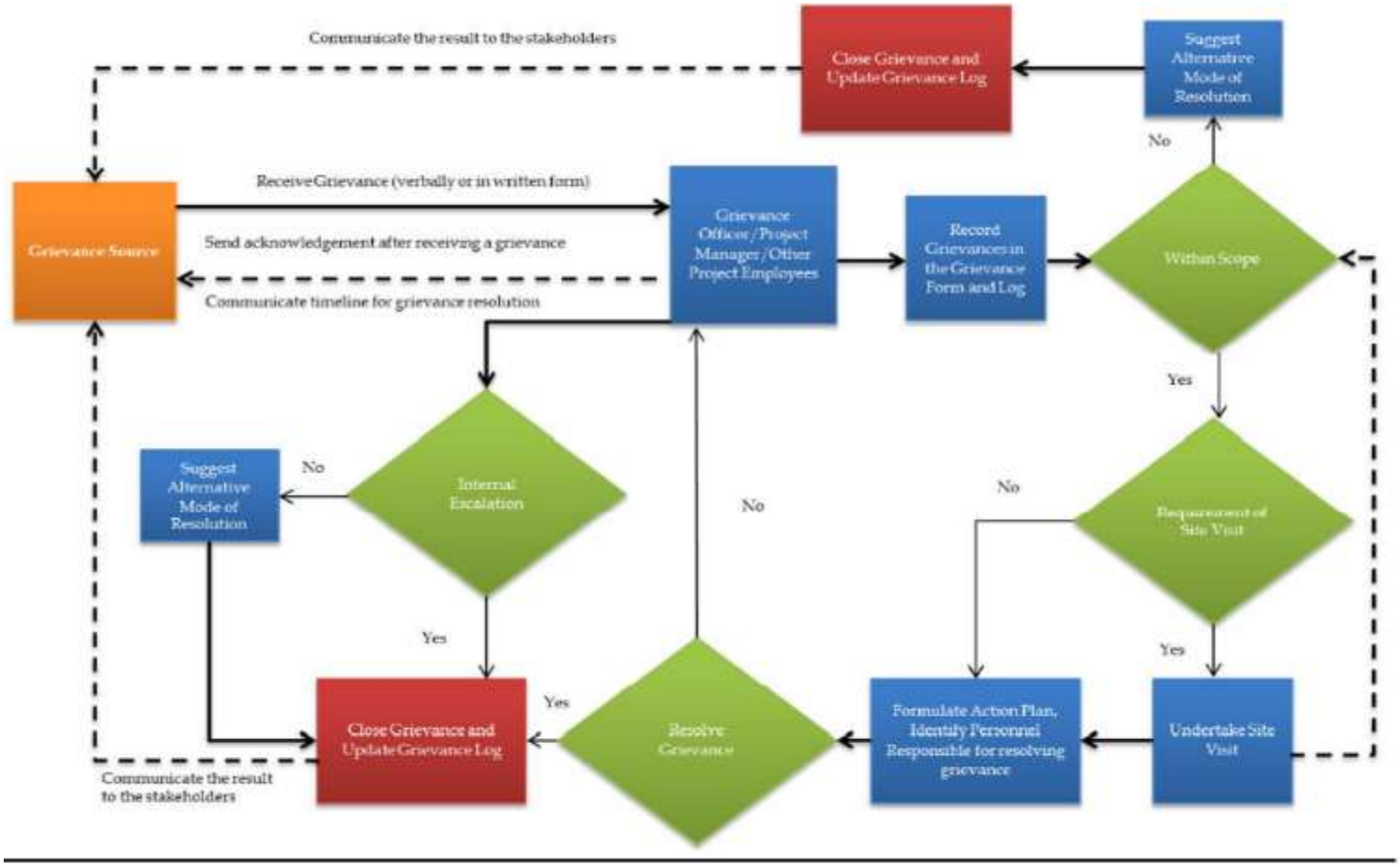


Figure 10-1: GRM Steps

10.5 Publicizing and Disclosure of the GRM

The GRM shall be disclosed to the stakeholders through written and verbal communication. The mediums to be used for this purpose are public meetings, group discussions, and provisioning of the GRM in the manner outlined in the previous section. The GRM disclosure shall be done along with the disclosure of other management plans.

10.6 Receiving and Recording Grievances

As part of the GRM, the grievances from the stakeholder or their representatives may be communicated verbally (in person or over a telephonic conversation) or in written form (in the format given below) to the project representatives or to the CLO directly. If the grievance is received directly by the CLO or other project representatives, it shall be recorded directly into the Grievance Form (see Table 10.1) as soon as the personnel return to site.

All project staff shall be informed that they must pass all grievances, communications to the Grievance Officer (discussed in the following section) on site as soon as possible after they are received. Suggestion boxes shall also be made available for the staff. Details of the person lodging the grievance shall be noted and passed along with the grievance. The CLO in turn shall communicate all grievances to the Environmental and Social Officers for the contractor or CWWDA. For assisting the communication of grievances, a register shall be maintained at the project office at which any individual/group can come have their complaint registered. Village leaders and government departments will also be advised to pass any complaints they receive to the site level community liaison officer.

10.7 Maintaining a Grievance Register

Each grievance thus received, shall be recorded in a grievance register. The format for the grievance register shall be as follows.

This grievance register shall be updated at each stage of the grievance redressal. Once the grievance is recorded in the register, a preliminary analysis shall be undertaken by the social officer to ensure that the grievance is within the scope of the GRM.

10.8 Acknowledgment of Grievance

Upon the completion of the recording of the grievance, the stakeholder shall be provided with an acknowledgment of the receipt, along with a summary of the grievance.

Table 10-3: Sample Acknowledgement Receipt for Claimant

This receipt is acknowledgement of grievance registration by_____
,resident of village_____, on date _____
His case number is _____
and the date for response is _____
Full name & signature of recording person_____

In case the grievance is assessed to be out of the scope of the GRM, a communication towards the same shall be made to the grievant, and an alternative mode of redressal shall be suggested.

10.9 Site Inspection and Resolution

For the purpose of verifying and resolving the grievances received, site inspection may not be required in all the cases. Depending upon the sensitivity of the issue, requirement of a site inspection will be identified.

A site inspection will be undertaken by the site level community liaison officers or the project member assigned by the contractor's Environment and Social officer. The purpose of the site inspection will be to check the validity and severity of the grievance.

For this purpose, the personnel may also undertake discussions with the concerned external stakeholder. The inspection will be undertaken within ten days of receiving the grievance. The assigned individual will then work with other relevant members of the Project team to investigate the problem and identify measures to resolve the grievance as appropriate. The personnel to be involved in the grievance resolution shall be dependent upon the nature of the grievance.

10.10 Resolution, Escalation, and Closure

Based on the understanding thus developed, the CLO, in consultation with the concerned departments, shall identify a suitable resolution to the issue. This could involve provision of information to clarify the situation, undertaking measures to remedy actual problems or compensate for any damage that has been caused either by financial compensation or compensation in-kind, and introduction of mitigation measures to prevent recurrence of the problem in the future. This resolution shall be accordingly communicated to the grievant within 10 working days of completing the site investigation.

10.11 Update of Records

The records of the grievance register shall be updated every working week with the present status of the grievance. Once the grievance is resolved, and the same has been communicated to the grievant, the grievance shall be closed in the grievance register. The grievance register should also provide an understanding of the manner in which the grievance was resolved. These instances shall then serve as references for any future grievances of similar nature.

10.12 GBV, SEA and SH GRM

There shall be a separate reporting mechanism for GBV, SEA and SH cases that are discrete from standard GRM. Issue from this mechanism shall not go through the typical GRM. The CWWDA Social Expert supported by the Social Expert from the contractor's end shall be the focal point and shall establish the system to handle these complaints that shall include reference to confidentiality, safety and survivor-centered approach. All registration of the data shall be confidential and anonymized.

10.13 GRM Monitoring and Implementation

It is important to monitor GRM to ensure that the grievances are addressed and resolved. The monitoring of the GRM implementation shall be undertaken on a monthly basis by the CWWDA team. Monitoring shall include:

- Auditing the implementation of the GRM;
- Monitoring the formal and informal consultation activities conducted with the stakeholder groups with respect to GRM;
- Tracking feedback received from engagement activities;
- Recording and tracking commitments made to communities; and
- Assessing the efficacy of the engagement activities in terms of the desired outcomes and the participation of the stakeholder groups.

10.14 GRM Reporting

The performance of the GRM shall be reviewed on a quarterly basis during the implementation period. For the purpose of review, the quarterly reports shall be considered for analysis and discussion. On the basis of these reports, a Grievance Redressal Report shallbe prepared.

11 CONCLUSION

This report presents a comprehensive environmental and social impact assessment for the proposed Mwache/West Mainland and Chamangwe Pipeline and proposed measures for mitigating the adverse impacts while enhancing the positive ones during the phases of construction, operation and maintenance. The following conclusions have been arrived at regarding the proposed pipeline ransmission line and reservoir. The anticipated benefits of the construction and operation and maintenance of the Project are immense. The project will provide a clean and reliable supply of water to the region, which comes along with many benefits. For the project components, which are suggested to be maintained and those where alternatives were provided, an evaluation of the positive and negative impacts was performed, and an Environmental and Social Monitoring Plan (ESMP) drawn. All negative impacts can be mitigated following the ESMP.

The negative impacts identified in this ESIA during the planning, construction, operation and decommissioning phase of the project, including waste generation, air pollution, noise pollution, occupational health and safety impacts, community health and safety impacts, traffic, labour influx and gender impacts will be limited to the transmission line ROW/wayleaves and can be mitigated using the measures proposed in the ESMP as well as the preparation and implementation of C-ESMPs including but not limited to:-

- ✓ *Health, Hygiene and Safety Plan*
- ✓ *Labour Management Plan*
- ✓ *Child Protection Strategy*
- ✓ *Waste Management Plan*
- ✓ *Traffic Management Plan*
- ✓ *Contractors Code of Conduct, specific provisions for VAC, SEA and SH*
- ✓ *Gender Inclusivity Strategy*
- ✓ *HIV/Aid Prevention Strategy*
- ✓ *GBV Action Plan, including:*
    - ✓ *SEA Prevention and Response Strategy*

Other plans to aid the implementation of the safe project implementation will be included as the project continues. The adverse impacts on the physical and natural environment will be "in sum total," not significant, and can be handled through the provided mitigation measures. There are incremental costs required to achieve these. The contractor shall be legally bound to implement this ESMP and any subsequent C-ESMP that shall be developed prior to the commencement of the construction works. This obligation shall be explicitly stated in the ToR, bidding documents and the final executed works contract. Based on the immense project benefits and the identified negative impacts which can be mitigated in the proposed ESMP, we strongly contend that NEMA will find this ESIA study satisfactory and the project environmentally and socially viable to be permitted to take off.

12 REFERENCES

1. Adminusr. (2020, February 21). *2019 Kenya Population and Housing Census reports*. Kenya National Bureau of Statistics. https://www.knbs.or.ke/2019-kenya-population-and-housing-census-reports/
2. Building Code 2000 Government Printer, Nairobi Constitution of Kenya, 2010.
3. Environment Impact Assessment guidelines and administrative procedures –November 2002, NEMA–Website
4. Environmental (Impact Assessment and Audit) Regulations of 2003
5. Environmental Management and Coordination (Emissions Control) Regulations, 2006 Government printer, Nairobi
6. Environmental Management and Coordination Act Number 8 of 1999. Government Printer, Nairobi
7. Feasibility Study Report
8. Genetic Resources and Benefit Sharing) Regulations. Nairobi: Government Printers.
9. Kenya gazette supplement, Special Issue 51, Legal Notice number 19; Environmental Management and Coordination (Wetlands, Riverbanks, Lake Shores and Sea Shore Management) Regulations, 2009 Government printer, Nairobi
10. Kenya Government (2010). The Local Government Act, CAP 265
11. Kenya Government (2012). Land Act, No. 6 of 2012
12. Kilifi County Integrated Development Plan 2018-2022
13. Kwale County Integrated Development Plan 2018-2022
14. MIBP, & Koei, N. (2017). Project on master plan for development of Mombasa special ... - jica. https://openjicareport.jica.go.jp/pdf/12245486.pdf
15. Ministry of Environment Kenya. 2003. Legal Notice 101: Environment Impact Assessment Audit Regulations. Nairobi: Government Printers.
16. Ministry of Environment Kenya. 2004. Legal Notice 31: The Factories and Other Places of Work (Safety and Health Committee) Rules. Nairobi: Government Printers.
17. Ministry of Environment Kenya. 2006. Legal Notice 120: Environment Management and Coordination (Water Quality) Regulations. Nairobi: Government Printers.
18. Ministry of Environment Kenya. 2006. Legal Notice 121: Environmental Management and Coordination (Waste Management) Regulations. Nairobi: Government Printers.
19. Ministry of Environment Kenya. 2006. Legal Notice 160: Environment Management and Coordination (Conservation of Biological Diversity and Resources, Access to
20. Ministry Of Environment Kenya. 2009. Legal Notice 61: Environmental Management and Coordination (Noise And Excessive Vibration Pollution) (Control) Regulation.
21. Ministry Of Environment Kenya. 2014. Legal Notice 41: Environment Management and Coordination (Air Quality) Regulations. Nairobi: Government Printers.
22. Ministry Of Labour Kenya. 2005. Legal Notice 24: The Factories and Other Places of Work (Medical Examination) Rules. Nairobi: Government Printers.
23. Ministry Of Labour Kenya. 2005. Legal Notice 25: The Factories and Other Places of Work (Noise Prevention and Control) Rules. Nairobi: Government Printers.
24. Ministry Of Labour Kenya. 2007. Legal Notice 59: The Factories and Other Places of Work (Fire Risk Reduction) Rules. Nairobi: Government Printers.
25. Ministry Of Labour Kenya. 2007. The Factories and Other Places of Work (Hazardous

26. Ministry Of Labour Kenya. 2007. The Occupational Safety and Health Act 2007, No. 15. Nairobi: Government Printers.
27. Mombasa County Integrated Development Plan 2018-202
28. National Gender and Development Policy 2000
29. NEMA Sector Checklists Guidelines.
30. Registrar of International Treaties and other Agreements in Environment (UNEP 2005)
31. Republic Of Kenya (1972). Laws Of Kenya: The Factories and Other Places Of Work
32. Republic of Kenya (2005). Noise Prevention and Control of 2005. Government Printer, Nairobi.
33. Republic of Kenya (2006). The Water Quality Regulations of 2006. Government Printer, Nairobi
34. Republic of Kenya (2007). Employment Act of 2007. Government Printer, Nairobi.
35. Republic of Kenya (2007). Fire Risk reduction Regulations of 2007. Government Printer, Nairobi.
36. Republic of Kenya (2007). Labour Relations Act of 2007. Government Printer, Nairobi.
37. Republic of Kenya, 1986, Public Health Act
38. Republic of Kenya, 1996, Physical Planning Act.
39. Republic Of Kenya, EMCA (Waste Management) Regulations, 2006
40. Republic of Kenya, Environmental & Development Policy (Sessional Paper No. 6 of 1999)
41. Substances) Rules. Nairobi: Government Printers.
42. The Environmental (Impact, Audit and Strategic Assessment) regulations, 2009
43. The National Construction Authority Act 2011
44. The Occupational Safety and Health Act, 2007
45. Vision 2030: A Globally Competitive and Prosperous Kenya, Ministry of State for Planning, National Development and Vision 2030

13 ANNEXES

13.1 ANNEX A: LIST OF PARTICIPANTS CONSULTED

EMC Consultants

CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 15/11/2022

VENUE: Public Baraza Bradcast Social Hall Jomvu - Birikani

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	Paul Ajiko		0720719099		
2	Dennis Egesa	Chairman	0723116462		
3	OTWAR MOSES OWINO	ASST. CHIEF	0726160157	otwarmoses@gmail.com	
4	KARISA KOMBE	VILLAGE ELDER	0726108912		
5	Kahindi Fondo Birya	V. ELDER	0720518645	[illegible]@gmail.com	
6	Jemima Alunga	Balozi	0773936100		
7	Hope Chanya	V. ELDER	0111775342		

Name	Telephone	Sign
8. MARTHA MAIYA	0704719615	
	0703696786	
9. ELIZABETH AKINYI OPANDO OPEKE	~~07~~ 0795955791	
10. JAMES OCHIENG	0721306038	
11. BARAM ASSA	0711464986	
12. BENARD AMISI	0716762321	
13 SAMUEL OTIENO	0716400758	
14		
15.		
16.		
17.		
18.		
19.		
20.		
21.		
22.		
23.		
24.		

PUBLIC BARAZA

DATE__________ TIME__________ VENUE__________

ATTENDANCE LIST

S/NO	NAME	ID NO	TEL. NO.	SIGN
1	Maiko Kinnes Mark	22158960	0721-335432	[signature]
2	Emmanuel Cheruiyot	24062974	0724-115944	[signature]
3	Halima Ali Mohamed	14188880	0722377850	Halima
4	Rahmatan Abdulrahman	2257559	0708510257	[signature]
5	Abdulkheir Mohamed	4169722	0722823005	[signature]
6	Hamisi Saidi Chengo	28141549	0722-665951	[signature]
7	Josphine Kambua Nyamai	2156185	0727870976	[signature]
8	Karisa Kenneth Kahindi	11762136	0726607822	[signature]
9	Bakua Chakama	2261545	0723907265	Bakua
10	Lulu Hussein Khayer	20837282	0700551644	[signature]
11	Amani Mzuri Haji	22700876	0713906895	[signature]
12	Dickson Katembe Mwiri	20067191	0706579810	[signature]
13	Khalid Obiri Ranghi	23341526	0720459665	[signature]
14	David Mwangela	20277681	0769013880	[signature]
15	John Zacharia.		0707046488	[signature]
16	Justine Mengich.	9329620	0716131345	[signature]
17	Jackline Muhuku	24711664	0795282120	[signature]

PUBLIC BARAZA

DATE__________ TIME__________ VENUE__________

ATTENDANCE LIST

S/NO	NAME	ID NO	TEL. NO.	SIGN
1	Caroline Namtiri	20862016	0721579130	[signature]
2	Habiba Bakari Omary	8726629	0722728038	[signature]
3	Millicent Jumo	28142908	0729521496	[signature]
4	Nasim Abdalla	8535135	0718553150	[signature]
5	Catherine Mwangi	2416807	0725028176	[signature]
6	John Omumu	27115486	0702492610	[signature]
7	Christine Mwikali	13714560	0726421625	[signature]
8	Patricia Mbithe	32818444	0743613169	[signature]
9	Hadija Denia	22470054	0710155712	[signature]
10	Kibibi Mgandi	26626801	0757565345	[signature]
11	Esther Wanjiru	22071903	0115598317	[signature]
12	Emily Nabwire	7897423	0713122126	Bulima
13	Elizabeth Mutua	23852805	0724600725	[signature]
14	Deka Abdi	28906524	0714233633	Deka
15	Fariha Ibrahim	24555521	0729449795	[signature]
16	Misti Bakari	22978890		
17	Nurto Ibrahim Adera	12912616	254762267071	[signature]

PUBLIC BARAZA

DATE 15/11/2022 TIME 1435 VENUE

ATTENDANCE LIST

S/NO	NAME	ID NO	TEL. NO.	SIGN
1	Silvester Ntue	13553812	0722274654	
2	Caroline Ngeio	23085775	0733555338	
3	Festus Mwite	36527247	0746684682	
4	Joseph Hinyuwag	7149344	0722835217	
5	Bernard Munyi	22188170	0726882000	
6	MOSES OCHIENG	20376641	0706552687	
7	Mama Musnahili	30592506		
8	GEORGE O ONYANGE	20216420	0734751297	
9	Zulfa salim mohamed	10942508	0760606621	
10	Josphat Thego	0722489043	1410880804	
11	MWANAJUMA NGETI	11457463	0715772407	
12	AMINA SHEE	31083977	0717401655	
13	SALAMA MUSA RASHID	3115 8511	0729176732	
14	RISPER ODAWA	23660633	0700245473	
15	EUNICE SIDI MWAMI	20274202	0797392885	
16	Owlija Bashir Yarrow	34726371	0729978185	
17	JOHN MAINA NJERI	26265550	0922938542	

PUBLIC BARAZA

DATE TIME VENUE

ATTENDANCE LIST

S/NO	NAME	ID NO	TEL. NO.	SIGN
1	FREDRICK LIKOTE OCHIENG	14719665	0718748171	
2	ELIZABETH JOSEPH MULI	27796779	0715504021	
3	GLORIA MSHAMBA MNJIRA	23713143	0726-100750	
4	MWANATE OMAR AMIRA	0503118	0716467775	
5	catherine mvera mailu	30457973	0717201544	
6	SHALLET MWAKA RONNIE	23860361	0705955972	
7	JOYCE MBEYU RONO	3130348	0748442061	
8	RUTH WAMBOI MAIMA	31953107	0759454005	
9	Robert Wagura Gathua	22605937	0722574215	
10	Mwanajuma Romo Bidu	20562760	0706760481	
11	Umazi Haranga Fi Bund	37360445	0793847592	
12	MARIUM LAURY	22981062	0115409548	
13	ZAWADI KALUME SHINDO	30392118	0741027913	
14	WINNIFRED JEMUTAI	25641871	0711181647	
15	SAUMU HAMISI	24353034	0795913395	
16	RUKIA MOHAMED	14491889	0726782128	RUKIA
17	Mawia Nzomba	20286514	0720683417	

CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 25/10/2022 VENUE: County Governor's Office

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	Asha Neno	Secretary	0721540764	nenoasha@yahoo.com	
2	Paul Ayieko	EIA Expert	0720749227	paul@emconsultants.org	
3	Nur Mohamed	CGK- C.O. Environment	0757555656	nur.omar.m@gmail.com	
4	[illegible] M. Mukoko	CO. [illegible]	[illegible]	[illegible]@gmail.com	
5	MARK OWUONDO	EIA Expert	0720[illegible]	clay@emconsultants.	
6					
7					

CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 27/10/22. VENUE: County Commissioner, Kilifi

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	Geoffrey Tanui	DCC	0722426555	dcckilifinorth@gmail.com	
2	Paul Ayieko	EIA	0720749924	paul@emconsultants.org	
3	Mark Owuondo	EIA	0720 320543	clay@emconsultants.org	
4					
5					
6					
7					

EMC Consultants
ENVIRONMENTAL KNOWLEDGE IN PRACTISE

CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 02/11/2022 VENUE: MOSWASCO's Office

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	Mark Mwambeta	Planning & Design Engineer	0726553052	m.mwambeta@mombasawater.co.ke	
2	Paul Ayieko	EIA Expert	0720979997	paul@emconsultants.org	
3	MARK OWUONDO	EIA EXPERT	0720320573	clay@emconsultants.org	
4					
5					
6					
7					

EMC Consultants
ENVIRONMENTAL KNOWLEDGE IN PRACTISE

CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 01/11/2022. VENUE: DCC's Office, Rabai

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	Salat ISSA	DCC Rabai	0711862728	Salatissa@gmail.com	
2	MWAMBASHA BAYA	SNR A/CHIEF	0727751825	mbauwalhabaya@gmail.com	
3	ETHEL KUVUMA	PRIEST	0714746260	ethelkuvuma@gmail.com	
4	FRANK M. MWACHINGA	ASST CHIEF	0726865482	mwachinzungufrank@gmail.com	
5	NIA M. NDUNE	ASST CHIEF	0711873528	mandune5@gmail.com	
6	BONIFACE TSUMA	ASST CHIEF	0700483721	bonifacetsuma@yahoo.com	
7	RASHID OSMAN	SUPKEM-RABAI	0710351465	rashidosman532@hotmail.com	

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CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 15/11/2022

VENUE: Public Baraza Bangladesh Social Hall Jomvu - Bishkow

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	Paul Apiako		0720719999		[illegible]
2	DENNIS EGESA	Chairman	0723164462		[illegible]
3	OTWAR MOSES OWINO	ASST. CHIEF	0726160157	otwarmoses@gmail.com	Otwar.
4	KARISA KOMBE	VILLAGE ELDER	0726108912		[illegible]
5	Khamisi Fondo Birya	V. ELDER	0720518645	[illegible]@gmail.com	[illegible]
6	Jemima Aluoch	Balozi	0773936100		[illegible]
7	Hope Chanya	V. ELDER	0111775342		[illegible]

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CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 10/11/2022

VENUE: Public Baraza, Kinunguna/Forodhani Sub-Loc Kilifi

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	FRANK M. MWACHINGA	ASST CHIEF	0726865482	mwachabungafrank@gmail.com	[illegible]
2	ALFRED RIKO MWALENGA	VILLAGE ELDER	0725225839	—	[illegible]
3	KHAMISI CHAI	Meb SS	0113931587	—	[illegible]
4	ALI ATHUMAN	VILLAGE ELDER	0748356532	—	[illegible]
5	NYAMAWI TUNJE	NYUMBA KUMI	0718149409	—	[illegible]
6	MWANJOLE CHAI	NYUMBA KUMI	0722864235	—	[illegible]
7	ATHUMAN D. KATAMA	VILLAGE ELDER	0707456455	—	Katama

CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 10/11/2022 VENUE: Public Baraza Kinongana/Faradhai-Sub Kilifi

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	TSORI KALAMA	VILLAGE ELDER	0725603563	—	
2	Beatrice Chivatsi	Nyumba Kumi	0725638911		
3	BRENDA M. CHAI	COMMUNITY			
4	MARY N. KARENGE	NYUMBA KUMI	0705884073	—	
5	AZIZA M. MWANGIRI	COMMUNITY	0708612520		
6	MWANGIRI M. KALONZI	COMMUNITY	0729856284		
7	EUNICE KAEISA	COMMUNITY	0798385381		

CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 10/11/2022 VENUE: Public Baraza Kinongana/Faradhai Kilifi

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	EMMA MWAMZIWE	Nyumba Kumi	0719297831	—	
2	EDDISON MUNGA	MEMBER	0798279592		
3	FRANCIS CHIVATSI	Nyumba Kumi	0793512640	—	
4	ADHOLLA MWACHAKSHI	MEMBER	0791192778	—	
5	LAMECK T. CHONGO	CHIEF	0723657386	Lameck.chonga@gmail	
6	SALIM N. CHIVATSI	MEMBER	0710357270		
7					

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STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 03/11/022 VENUE: Public Baraza Mwamdudu, Kwale.

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	Chigamba Pukusa Shea		0711849499		
2	Kui Mboga Kai		0700633578		
3	MAMBO MGANDI		0715543959		MAMBO
4	NDOSHO MWERO		0742299457		
5	JUMA MWERO		0718627112		
6	WILLMOT MGANDI		0769623512		
7	BAKARI MUMBA		0798317245		

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ENVIRONMENTAL KNOWLEDGE IN PRACTISE

CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 3/11/2022 VENUE: Public Baraza, Mwamdudu, Kwale

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	Stanley Gunguwa	Bonje	0790785581		
2	Luvuno Ndunga	Bonje			
3	NELSON Ndunga	BONJE	0718910759		
4	SAMUEL OUMA	BONJE	0797732792		
5	JANET KATEMBE	ZAGWARU	0716382237		
6	Jira Nemu Ng'ombe	Mwongoko			
7	Charo Mwamlongo Beja	Zaguaru			

Pg 3.

CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 3/11/2022 VENUE: Public Baraza, MWAMDUDU. Kwale

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	NAHERA M. JUMA	MWANGOKA	0726626885		
2	MGANDI M. MAMBO	ZAGWARU			
3	MWACHIDZO N. RAMA	ZAGWARU	0799066817		
4	HAMISI .M. NYONDO	CHONGONGENE	0742796383		
5	PETER Bete Jaglet	NYANDO	0722344118		
6	SALIM M. MTOI	NYANDO	0705211095		
7	RAMADHAN MUMBA	ZANGWARU			

Pg 1

CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 3/11/2022 VENUE: Public Baraza, MWAMDUDU Kwale

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	DAVID Zuma Ngome	RONGE	0710128197		
2	CHIMERA MEIPHE	MWANGOKA			
3	MWACHIDZO H. KABUNGA	ZAGWARU	0701985296		
4	Maimbo Kalandi				
5	Chimera Meiphe	Mwangoka			
6	Juma Mwera	Mwangoka			
7	Mzungu Ngabera	Zagwaru	0704515305		

Pg 7

	NAME	TELEPHONE	SIGN
8	Abubakar Kitayalza	0724194947 0780406838	
9	Sumeme Mangale Nyondo	0712651515	
10	Mangale Mzame Katana	0705109282	
11	Mlongo Ninanga Mbu	0716427393	
12	Ndoro Rai Kombo	0743489696 / 0104424275	
13	Juma Ndoro Rai	0701 354 670	
14	HASAN DUMES	0769121822	
15	KHAMISI KINANGU CHARO	0796260667 / 0737271559	
16	MOHAMED JUMAA MKOZI	0711537180	
17	MWANAKOMBO MAMBO BANJU	0712824465	
18	MUNIRA MWINYIFAK	0791548074	
19	MBODZE KALUME	0702980866	
20	MUNGA JAMES	0705723011	
21	Kilo BEDZAME	07 - - -	
22	HAMIS CHARUNGA	0715934958	
23	SAID MWANG'OMBE CHIMERA	0785617276	
24	SAKARI GUNGA	—	
25	MWANAMISI MUGANDE	—	
		Pg 8	

	NAME	TELEPHONE	SIGNATURE
8	Mgandi Dickson Mambo	0725059120	
9	Isuma Kombo Ndosho	0115003698	
10	John Chou	0769917323	
11	HEMED WATO MJERA	0742015559	
12	SOFIA MOHAMMED		
13	UMARI RAI NDORO	0742912198	
14	CHIZI CHAKA	07	
15	MUPA NDORO RAI		
16	DZAME RUMBA		
17	FATUMA HAMISI		
18	NAID HAMISI		
19	UMARI HARRY		
20	MBODZE CHOMBO		
21	SELINA TEMBE	0741434976	
22	MBEYU KATANA	0791045317	
23	MUPA NDORO	0743392415	
24	Masika Ngala	0705260083	
25	Mlongo Salim Mgandi	0703945475	
5	Mwaka Mwahui	0790647796	Pg 6

NAME			TELEPHONE	SIGN
Priscillar	Kitangalis	Manzo	0725428827	Kanga
Nzalambi	Kahareus		0798186916	
Fatuma	Saleman			
Asha	Shasan			
Hadija	Madau			
Mjeni	Kuelo			
Agness	Kitangalis	Manzo	0728572664	Nguea
Rida	Ngome		0793551235	
Dume	Hamisi		0714700863	
Tunguu	Katense		0722889255	
Mariam	Yama			
Mudo	Bembajr	Ndosho		
Mariam	Nyanje		0794807619	
Kadzo	Caparo		071788151	S-J
Salama	Jumaa			
Esther	Bahati			ESTHER
HASSAN	MKUBA		0710323748/0734280257	
Salama	Ngozi		0726804411	

NAME			TELEPHONE	SIGNATURE
EDWARD	MAMBO	NUNGA	0708432109 3	
Nelly	Kadzo		0769478537	
Medza	Yongwe		0795048066	
Chingaro	Marcheni			
Mangale	Mbudzya			
Meri	Mnyazi		0713908239	
Omari	Mraa			
Santa	Zadinie	Zamda		
Hadija	Karari			
Kupha	Chomba			
Cuemwe	Dzombo	Chiringa		
Medza	Shusi			
Mwampiti	Mwandongo			
Kwekwe	Bekaweka	Kaama		
Omari	Nyae			
Omari	Karari		0700526286	
Mwata	Katana			
Mjeni	Munga			

Pa 2 .

CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 04/11/2022 VENUE Public Baraza, Mwatsama

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	ABDHALLA SALIM		0100 611065		
2	SALIM ABDHALLA DZUYA		0794 278 584		
3	BAYA MKIARUA		0712 420 997		
4	MAMBO JOHA		0724 031 439		
5	MOHAMMED KANGO		0714 833 313		
6	KANGO DZUMBA				
7	JOHA MKUZI				

CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 04/11/2022 VENUE PUBLIC BARAZA, MWATSAMA, KILIFI

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	HAMISI CHAI RAMADHAN BANDA		0792 810 474		
2	NASORO BEPONDA CHAI				
3	THOMAS LWAMBI		0700 582 596		
4	TSAMA DZUMBA				
5	JOYCE MNYAZI		0792 351 585		
6	LOYCE REHEMA		0713 554 511		
7	MBODZE MUNGIA		0717 456 680		

CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 04/11/2022 VENUE: Public Baraza, Mwatsama

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	TSAMA MKUZI KAKONO				
2	JULIUS MKIAMBATI		0705 947 867		
3	TSAMA PANGA TSAMA				
4	LWIAMBI DENA		0715 628 267		
5	MWATELA TSUMA				
6	MWATELA MKIAKOMBO		0702 121 603		
7	NZAKA TSUMA				

CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 04/11/2022 VENUE: Public Baraza, Mwatsama

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	RAMADHAN PANGA		0710 541 834		
2	SAHA DZUMBA		0727 295 704		
3	DZUMBA KANGO		0700058 405		
4	NYAGUMDO MWASAGA		0717 063 588		
5	HAMISI KATANA		0721 766 912		
6	MOHAMMED MAZURI		0712 188 133		
7	MUMBA MUDZO		0728 907 201		

CONSULTANCY SERVICES FOR PREPARATION OF FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDIES/PROJECT REPORTS AND PREPARATION OF RESETTLEMENT ACTION PLANS (RAP) FOR THE PROPOSED MWACHE/WEST MAINLAND AND MWACHE/NORTH MAINLAND PIPELINES.

STAKEHOLDER ENGAGEMENT ATTENDANCE LIST

DATE: 04/11/2022 VENUE: Mwatsama Kibfi NEMA Office, Mombasa

No	NAME	DESIGNATION	TELEPHONE	EMAIL	SIGNATURE
1	SAID MZINGO		0703975911		
2	KHAMISI SAHA		0769 064 121		
3	SULEIMAN REBAYA		0748 039 858		
4	MUNGA LEWA				
5	SAUMU ABDHALLA				
6	SAUMU CHIMBIO				
7	FATUMA KALONGO				

13.2 ANNEX B: CHANCE FINDS PROCEDURE

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

If the Contractor discovers archeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction, the Contractor shall:

- Stop the construction activities in the area of the chance find;
- Delineate the discovered site or area;

Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the Ministry of State for National Heritage and Culture take over;

Notify the supervisor, Project Environmental Officer and Project Engineer who in turn shall notify the responsible local authorities and the Ministry of State for National Heritage and Culture immediately (within 24 hours or less);

Responsible local authorities and the Ministry of State for National Heritage and Culture would then be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archaeologists of the National Museums of Kenya. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage, namely the aesthetic, historic, scientific or research, social and economic values.

Decisions on how to handle the find shall be taken by the responsible authorities and the Ministry of State for National Heritage and Culture. This could include changes in the layout (such as when finding irremovable remains of cultural or archeological importance) conservation, preservation, restoration and salvage.

Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities. Construction work may resume only after permission is given from the responsible local authorities or the Ministry of State for National Heritage and Culture concerning safeguard of the heritage.

13.3 ANNEX C: MINUTES OF CONSULTATION MEETINGS

MINUTES OF THE PUBLIC CONSULTATION MEETING FOR THE ESIA / RAP STUDY FOR MWACHE WEST/NORTH MAINLAND PIPELINE PROJECT HELD ON 14TH NOVEMBER 2022 AT JOMVU CHIEF'S OFFICE

Subject/Ref	Final Environmental and Social Impact Assessment (ESIA) Studies/Project Reports and Preparation of Resettlement Action Plans (RAP) for the Proposed Mwache/West Mainland and Mwache/North Mainland Pipelines
County	Mombasa
Meeting Venue	Jomvu Chief's Office
Date and time of Meeting	14th November 2022, 0900hrs -1100hrs
\Project Representatives Present	Mr. Mark Owuondo – EMC Consultants
	Mr. Paul Ayieko – EMC Consultants
	Area Chief
No of Participants	**Male: 60**
	Female: 56
Distribution	Farmers, Local Administration, Clergy, Opinion Leaders, and Local Community

AGENDA OF THE MEETING

The agenda was as follows:

- Opening remarks/prayer
- Introduction of participants
- Overview of the agenda of the meeting by EMC Consultants
- Project description by CWWDA.
- Question and answer session
- Closing and adjourning of meeting

COMMENCEMENT OF THE MEETING

The meeting commenced after a word of prayer from one of the participants at the request of the area Chief. He then proceeded to introduce the Assistant County Commissioner for the sub county. He later gave the agenda of the meeting. He invited the team from EMC to make their presentation.

OVERVIEW OF THE AGENDA OF THE MEETING / PROJECT DESCRIPTION

Mark Owuondo (EMC Consultants) lauded participants for coming in large numbers and introduced the team from EMC Consultants. He gave a brief presentation of Coast Water Works Development Agency - CWWDA (the proponent) as a company and its affiliated activities in transmission of water and bulk water storage facilities.

He further explained CWWDA current Mwache/North and Mwache/West water transmission lines project activities in the county that's being done under the Water and Sanitation Development Project (WSDP). He also explained the various activities of the project including the design of the pipeline and the various bulk water storage facilities that are proposed to be setup along the pipeline routing. He also outlined the ESIA process to the participants and why it was necessary for the study to be conducted before the construction of the water transmission line project citing various impacts that may arise and mitigation measures that CWWDA would need to take in order to project minimize impacts.

Mr. Paul Ayieko also gave a brief overview of the project and the progress so far. He also explained that the study also included a RAP study of the particular pipelines. He emphasized on the need for the local community to expect a team from the consultants who would visit their households to document assets that are likely to be impacted by the project and also conduct a socio-economic census for the same. He explained that the RAP outcome would later be valuated and a report generated to assist the proponent in formulating a budget for compensation for those affected by the project

There were no objections to the project by the participants for as long as the mitigation measures put forward would be rigorously enforced during construction and operation phases of the project. The participants urged CWWDA to expedite the construction process should a license be availed by NEMA as this would benefit the locals economically.

INTERACTIVE SESSION WITH PARTICIPANTS

The meeting then progressed into an interactive session whereby the participants were given the opportunity to ask questions, make comments, seek clarification, air their views, concerns, and recommendations appertaining to proposed construction and operation of the facility.

A summary of the discussions is as below;

Topic	Participant	Issue Raised	Responses
Project Design	Bw. Ndaro	How will we identify the project route	The beacons were erected by the design engineer to help guide the process.
Employment	Kevin Kiti	Will the contractor employ our young men and women from here?	Yes, the project will employ both Men and Women from the locality during the construction phase. Available employment opportunities during operation phase will also target workers from the area.
Corporate Social Responsibility	Mr..Haroun Joto	What kind of CSR activities will you involve yourself with?	The proponent will get back to the locals on this request.
Noise Impacts	Bw.Katana	How will you control the noise from the equipment that will be used during the construction works?	The contractor will apply mitigation measures as set out in the Environmental and Social Management Plan (ESMP) that is part of the ESIA report under preparation. The activities are typical construction works for a medium structure which is unlikely to lead to elevated noise impacts beyond the standards for construction during the day. The equipment and machinery used to construct are not expected to generate noise above the noise standards that would be a nuisance to the public. Further, there are no sensitive receptors like health facilities, educational facilities

			within the proximity of the infrastructure, other than 3 homesteads. Equipment and machinery will be serviced regularly to minimize noise impacts. This mitigation measures will be included in the ESIA under preparation. Equipment and machinery will not be left idling (throttling) if not in use to minimize noise impacts during the construction and operation phases. Regular audits will be undertaken to ensure compliance.
Landscape & Visual Amenities and Access to community/ public areas.	Mambo Mgandi	Enquired on whether the project will hinder their livestock from accessing grazing land and ease of movement. Will the project rehabilitate the project area of influence?	Any excavated or cut and fill areas will be landscaped and revegetated; No debris or waste materials will be left at the work sites, good housekeeping on site to avoid litter and minimise waste will be practiced. The project area is also on private land with no known public utility and will be fenced (Hoarded) in order to restrict/ control movement.
Compensation	Peter Musyoka Mr.Benard Ndegwa	Enquired on whether the compensation will be fair because he never intended to move from wherever he and his family were living Wanted to know if compensation will only be for land only PAPs	Yes, the compensation will be in line with the current market value and a 15% disturbance fee included for any inconveniences. No, compensation will be for land, structure (fixed) and any other commercial

			activity that you may be doing on the proposed corridor for the pipeline.

CLOSING AND ADJOURNMENT

The ESIA consultant thanked the participants for creating time to attend the meeting. The consultant said that the adjournment of the meeting did not signal the end of engagement. The participants were invited to share further comments and views via the consultants' contact details that were provided.

The Senior Chief made his closing remarks by thanking the participants for availing themselves for the meeting despite their busy schedules and for the contributions they made.

The meeting ended with a word of prayer from a member of the community.

MINUTES OF THE PUBLIC CONSULTATION MEETING FOR THE ESIA / RAP STUDY FOR MWACHE WEST/NORTH MAINLAND PIPELINE PROJECT HELD ON 15TH NOVEMBER 2022 AT BIRIKANI SOCIAL HALL

Subject/Ref	Final Environmental and Social Impact Assessment (ESIA) Studies/Project Reports and Preparation of Resettlement Action Plans (RAP) for the Proposed Mwache/West Mainland and Mwache/North Mainland Pipelines
County	Mombasa
Location	Jomvu
Meeting Venue	Birikani Social Hall
Date and time of Meeting	15th November 2022, 0900hrs -11:30
\Project Representatives Present	Mr. Mark Owuondo – EMC Consultants
	Mr. Paul Ayieko – EMC Consultants
	Area Senior Chief
No of Participants	**Male: 77**
	Female: 25
Distribution	Farmers, Local Administration, Clergy, Opinion Leaders, and Local Community

AGENDA OF THE MEETING

The agenda was as follows:

- Opening remarks/prayer
- Introduction of participants
- Overview of the agenda of the meeting by EMC Consultants
- Project description by CWWDA.
- Questions and answer session
- Closing and adjourning of meeting

COMMENCEMENT OF THE MEETING

The meeting commenced with a word of prayer from the area Chief.

The Chief then invited the Consultant from EMC to address the attendees on the proposed project.

OVERVIEW OF THE AGENDA OF THE MEETING / PROJECT DESCRIPTION

Mark Owuondo (EMC Consultants) lauded participants for coming in large numbers and introduced the team from EMC Consultants. He gave a brief presentation of Coast Water Works Development Agency - CWWDA (the proponent.

He further explained CWWDA current Mwache/North and Mwache/West water transmission line project activities in the county that's being done under the Water and Sanitation Development Project (WSDP). He also took the participants through the various activities of the project including the design of the pipeline and the various bulk water storage facilities that are proposed to be setup along the pipeline routing. He also outlined the ESIA process to the participants and why it was necessary for the study to be conducted before the construction of the water transmission line project citing various impacts that may arise and mitigation measures that CWWDA would need to take in order to project minimise impacts.

Mr. Paul Ayieko also gave a brief background of the project. He explained that the study also included a RAP study of the particular pipelines. He emphasized on the need for the local community to expect a team from the consultants who would visit their households to document assets that are likely to be impacted by the project and also conduct a socio-economic census for the same. He explained that the RAP outcome would later be valuated and a report generated to assist the proponent in formulating a budget for compensation for those affected by the project

The participants assured the consultant that they will support the projects since the objective is to deal with the shortage of water in the area once and for all.
They however requested the consultant to recommend favorable ways of taking care of the negative impacts of the project especially during construction phase.

INTERACTIVE SESSION WITH PARTICIPANTS

The meeting then progressed into an interactive session whereby the participants were given the opportunity to ask questions, make comments, seek clarification, air their views, concerns, and recommendations appertaining to proposed construction and operation of the facility.

A summary of the discussions is as below;

Topic	Participant	Issue Raised	Responses
Project Design	George Juma	Will the project routing be marked?	Yes the project routing will be marked/beaconed to provide guidance to the contractor and also the locals.
Employment	Khadija Charo	Will the project provide employment to our youth?	All the jobs that do not require skills will be given to the locals.
Corporate Social Responsibility	Hassan Munezo	Can the project through the CSR initiative construct like a mosque or church to the locals	This will be discussed with the local leaders and the locals informed of the outcome of the discussion.
Noise Impacts	Bw. Mwero	How will the contractor handle the negative impacts especially during construction?	The contractor will apply mitigation measures as set out in the Environmental and Social Management Plan (ESMP) that is part of the ESIA report under preparation. The activities are typical construction works for a medium structure which is unlikely to lead to elevated noise impacts beyond the standards for construction during the day. The equipment and machinery used to construct are not expected to generate noise above the noise standards that would be a nuisance to the public. Further, there are no sensitive receptors like health facilities, educational facilities within the proximity of the infrastructure, other than 3 homesteads.

			Equipment and machinery will be serviced regularly to minimize noise impacts. This mitigation measures will be included in the ESIA under preparation. Equipment and machinery will not be left idling (throttling) if not in use to minimize noise impacts during the construction and operation phases. Regular audits will be undertaken to ensure compliance.
Landscape & Visual Amenities and Access to community/ public areas.	Peter Mwanzia	What will happen in areas where the trenches will hinder us from accessing churches, mosques or even our children accessing schools?	Any excavated or cut and fill areas will be landscaped and revegetated; No debris or waste materials will be left at the work sites, good housekeeping on site to avoid litter and minimise waste will be practiced. The project area is also on private land with no known public utility and will be fenced (Hoarded) in order to restrict/ control movement.
Compensation	Peter Musyoka Mr.Benard Ndegwa	Enquired on whether the compensation will be fair because he never intended to move from wherever he and his family were living Wanted to know if compensation will only be for land only PAPs	Yes, the compensation will be in line with the current market value and a 15% disturbance fee included for any inconveniences. No, compensation will be for land, structure (fixed) and any other commercial activity that you may be doing on the proposed corridor for the pipeline.

CLOSING AND ADJOURNMENT

The ESIA consultant thanked the participants for creating time to attend the meeting. The consultant said that the adjournment of the meeting did not signal the end of engagement. The participants were invited to share further comments and views via the consultants' contact details that were provided.

The Senior Chief made his closing remarks by thanking the participants for availing themselves for the meeting despite their busy schedules and for the contributions they made.

The meeting ended with a word of prayer from a member of the community.

13.4 ANNEX D. SELECTED PHOTOGRAPHS