COAST WATER SERVICES BOARD

ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT FOR THE PROPOSED MZIMA II WATER PIPELINE

MAY 2018

Declaration

This Environmental Impact Assessment (EIA) Study Report for the proposed Mzima II pipeline project has been prepared by the EIA Team in collaboration with the Proponent.

Signed for and on behalf of the:

Proponent:

Chief Executive Officer,
Coast Water Services Board (CWSB)

Torrut

Environmental Impact Assessment Team:

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List of acronyms and abbreviations

BPT	Break Pressure Tank.
CWSB	Coast Water Services Board
CBO	Community Based Organisation
CR	Critically threatened
DD	Data deficient
EA	Environmental Audit
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
ESMP	Environmental and Social Management Plan
GOK	Government of Kenya
IBA	Important Bird Area
KDHS	Kenya Demographic and Health Survey
KENHA	Kenya National Highways Authority
KPLC	Kenya Power and Lighting Company
KWS	Kenya Wildlife Services
LC	Least Concern
MWI	Ministry of Water and Irrigation
NEMA	National Environment Management Authority
NT	Near threatened.
NGO	Non-Governmental Organisation
PAP	Project Affected Person
RAP	Resettlement Action Plan
RE	Resident Engineer
TOR	Terms of Reference
UNESCO	United Nations Educational, Scientific and Cultural Organization
VU	Vulnerable

Non-Technical Executive Summary

1.0 Background

There is a growing concern in Kenya and at global level that many projects are causing damage to the environment. Activities carried out to realize the said projects have the potential to damage the natural resources upon which the economies are based if preventive measures are not put in place. A major challenge globally and nationally today is how to balance development objectives and ecological concerns. To achieve this balance, various environmental management tools have been developed. Environmental Impact Assessment (EIA) is among the many tools for the protection of the environment from the negative effects of development activities. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound.

In Kenya, EIA became compulsory after the enactment of Environmental Management and Coordination Act (EMCA) (Revised, 2015). According to, EMCA, and its subsequent Environmental (Impact and Audit) Regulations, 2003, it is mandatory to get environmental clearance for all projects in the Second Schedule of EMCA. Among these projects are; rivers and water resources development and waste disposal projects including:

i. *Storage projects, barrages and piers;*
ii. *Rivers diversions and water transfers between catchments; flood control schemes;*
iii. *Drilling for the purpose of utilizing ground water resources including geothermal energy.*
iv. *Sites for hazardous waste disposal;*
v. *Sewage disposal works;*
vi. *Works involving major atmospheric emissions;*
vii. *Works emitting offensive odours;*
viii. *Sites for solid waste disposal.*

(EMCA, Second Schedule; Part IV.)

The proposed Mzima II pipeline for water transmission from Mzima springs thus falls under projects which must undergo an environmental impact assessment before implementation. The EIA is based on predictions. It attempts to predict the changes in environmental quality which would result from the interaction between proposed project activities and the environment in its totality (Biophysical, socio-cultural, economic and political). The EIA attempts to weigh environmental effects on a common basis with economic costs and benefits and finally it is a decision-making tool. The EIA is a procedure used to examine the environmental consequences, both beneficial and adverse, of a proposed development project and to ensure that these effects are taken into account in project design.

2.0 Water supply and demand at the Coast of Kenya.

Water demand in the Coast Province depends mostly on a bulk water supply system comprising of the Mzima Pipeline, Marere Pipeline, Tiwi Boreholes and Sabaki Pipeline. Taveta Township and the surrounding villages are supplied with water from the high-yielding Njoro Kubwa Springs (separate from the bulk system). It is suggested that this scheme will be connected only to Taveta town, following major rehabilitation and expansion. The township of Lamu depends on the local Shella aquifer. Hola town abstracts water directly from the Tana River. The current water supply capacity at the Coast is as follows:

Source	Capacity	Year developed
Mzima Springs	35,000	1957
Marere Springs (with Pemba)	12,000	1923
Baricho Wellfield	90,000	1980
Tiwi Aquifer	13,000	1980
Njoro Kubwa Springs	3,000	1990
Tana River	1,400	1965
Shella Aquifer	1,800	Unknown
Total	**149,200**	

Source: Republic of Kenya (2013)

This supply is against a growing demand as shown in the table below:

Urban Centre	Urban Water Demand (m3/day)					
	2,012	2,015	2,020	2,025	2,030	2,035
Mombasa	140,999	155,840	188,236	243,288	280,501	317,715
Kwale	23,396	25,764	31,096	39,775	48,956	58,136
Kilifi	37,723	41,516	51,616	65,090	79,823	94,555
Taita Taveta	14,778	16,615	19,554	23,494	28,261	33,028
Lamu	4,300	18,568	37,462	62,068	89,314	116,560
Tana River	3,597	4,340	5,207	6,036	7,629	9,222
Total Population	224,793	262,643	333,171	439,751	534,483	629,216

Source: Republic of Kenya (2013)

To meet the projected water demand at the Coast of Kenya, various projects have been proposed. Among the proposed projects is Mzima II.

3.0 Project Description

The Project involves funding, design and construction of 220km of diameter 1,200mm pipeline and related appurtenances capable of transmitting 105,000m3/d of water from Mzima Springs to various coastal region towns in Taita Taveta, Kwale, Kilifi and Mombasa Counties. The project shall comprise of the headwork, the intake, the main water supply pipeline, Break pressure tanks, water supply along the pipeline route and water delivery to the terminal tanks at Mazeras.

Design analysis found out that the existing waterworks at Mzima Springs have a capacity to abstract the required 1.22 M^3/s, the bottleneck to transfer this amount is the existing 30"(762 mm), 1,300 m long pipeline between the intake and the overflow chamber.

The pipeline from Mzima headwork to the existing control chamber of reservoirs in Mazeras, includes line valves, air valves, washout valves, and regulating valves. Considering the physical characteristics, construction convenience, anticorrosion capacity, safe operation requirement, repair conditions and investment cost and combining the factors such as the project scale, pipe sizes, working pressure, geological conditions, terrain, loading requirement, construction conditions, construction time, ductile iron pipe is selected as the pipe material as the main pipeline. Mild steel pipe shall be used for crosses barriers such as railways, roads and rivers. The recommended protective measures for both steel and Ductile Iron components are specified in the detailed technical report. The pipe diameters for construction area DN1400, DN1200, DN1000, DN900; the total length of transmission pipeline is 219.4km.

Reinforced Concrete Break Pressure Tanks with volume of $400m^3$ are design to regulating pressure along the pipeline and also provides safety in case of pipe burst as valves limit the discharge. A total of 10 BPTs are designed along the pipeline, each station includes 2 (twin) break pressure tanks, two float valves installed at the inlet of each tank to regulate the water level and flow meter installed at the outlet of break pressure tank.

Rehabilitating and upgrade of the existing disinfection facility to cope with the increased abstraction is considered. For urban use, chlorination and disinfection will always be a “must” before supplying portable water to consumers.

The proposed pipeline will be parallel to the existing one. The service road of the existing pipeline is in bad condition, rehabilitation shall be required for the construction of the proposed pipeline. The existing 30m reserve will be adequate for the new pipeline and access road.

4.0 EIA Methodology

The environmental impact assessment study comprised the following activities: mobilization, consultation with stakeholders, a screening and scoping exercise, desk and field studies, data analysis, impact identification, and analysis of health and safety issues associated with the proposed project.

A combination tools was employed to execute the assignment. These include:

- Documents analysis.
- Unstructured Observation
- Collection of water and air samples for analysis.
- Noise measurement

Public consultation carried out by:

- Key informants' interviews,
- Phone interviews.
- *Barazas* and
- Questionnaire administration.

5.0 Positive impacts

The proposed Mzima II will generate positive impacts during the throughout the project lifecycle. These positive impacts include:

- Employment.
- Growth of secondary businesses
- Improved well-being of women and children
- Enhanced Water supply which translates to improved psychological well-being of households
- Increased Profits for Businesses in the Project area
- Revenue to the Exchequer
- Infrastructure development
- Reduced conflicts among users of upstream and downstream beneficiaries.
- Reduced cases of water borne diseases

6.0 Potential negative impacts and mitigation measures

These negative impacts will manifest during the construction and operation phases of the propose Mzima II project. However, these most of them are short term and irreversible with the application of the proposed mitigation measures.

Impact	Mitigation measures
▪ Water pollution	▪ Sanitation facilities shall be located within 100m from any point of work, but not closer than 50 m to any water body. ▪ All temporary/portable toilets shall be secured to the ground to prevent them toppling due to wind or any other cause. ▪ Only approved portable toilets should be used. ▪ These facilities shall be maintained in a hygienic state and serviced regularly. ▪ The contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from site to an approved disposal site. ▪ Discharge of waste from toilets into the environment and burying of waste is strictly prohibited. ▪ Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas, which include groundwater, are not polluted. ▪ Containers of chemicals and hazardous substances used on the sites should be confined in secure holding areas before disposal to approved sites by licensed waste handlers. ▪
▪ Soil erosion and contamination	▪ Limit clearance of vegetation only on the way leave as much as possible to minimize exposure of soil to agents of erosion. ▪ Put up barriers to protect soil from erosion along the pipeline route where there are steep edges. ▪ Service machines, vehicles and heavy equipment to ensure there is no spillage of oil and greases during operations. ▪ Labelling all hazardous substances and providing work instructions in their use.
▪ Noise & Excessive Vibration	▪ Prevent exposure of construction workers to unacceptable noise levels. ▪ Minimize construction through night time whenever possible. ▪ PPE for workers operating machines that are generating noise and vibrations that can be injurious to their health. ▪ Limit construction to day time only unless with special permission.

Impact	Mitigation measures
▪ Habitat loss, degradation and fragmentation	▪ Restrict the operations relating to installation of the new pipeline to the existing pipeline wayleave, ▪ Restore cleared areas as soon as the pipes are installed and ensure landscaping to minimize soil erosion. ▪ Earthworks in ecologically sensitive areas including steep hillsides and river crossings need to be carried with great caution. ▪ Leveling and replanting and should be made mandatory.
▪ Interference with wild animal distribution and ranging patterns	▪ Use of less noisy machinery and equipment, ▪ Use of minimal number of vehicles and other equipment in the national parks ▪ Using an optimal workforce. ▪ Worker's camps should be located outside the national park.
▪ Potential for human wildlife conflicts – the risk of death or injury among workers	▪ Reducing the human footprint associated with water pipeline will be limited through controlling the number of workers allowed project site during the implementation, operation and decommissioning phases. ▪ At the beginning of the project, the workers will need to be briefed on the dangers they will be exposed to while working in wildlife habitats. They will be educated on how best to behave and protect themselves from dangerous animals. ▪ The workers should be accompanied by armed KWS rangers while working in the parks and other wildlife rich habitats. ▪
▪ Interference with tourism activities	▪ It will be crucial that the work at these sites be carried out as fast as possible and with as minimal impacts on biodiversity and aesthetics as possible. ▪ Pipeline trenches and other excavated sites should be covered as soon. ▪ Where practical, most of the work should be timed to coincide with low tourism season/time of day.
▪ Increased poaching of wild animals.	▪ Security agencies including Kenya Wildlife Service (KWS) should increase anti-poaching effort ▪ Avoiding establishment of workers' camps inside the parks and other wildlife rich habitats, in the area and minimizing human traffic within the area of operation. ▪ Enlisting the support of local community in ant-poaching activities

Impact	Mitigation measures
	▪ Sensitization of the workers and members of public on the importance of wildlife conservation, wildlife legislation particularly of the new the Wildlife Act 2013 (GOK, 2013), which has legislated very stiff penalties for wildlife poaching especially when endangered species are involved. ▪ Vetting, screening and profiling of the construction workers to streamline management of people involved in construction. This will ensure that only people with no criminal records are allowed in the park. ▪ The workers should be accompanied by security officers as part of the park regulation of ensuring their safety and wildlife. ▪ Strict observance of Park Rules and Regulations. ▪ Inspection of all construction vehicles entering and or leaving the protected areas of Tsavo National park. ▪ Creating a single manned entry and exit for construction workers and vehicles where the pipeline exits Tsavo West. The same case should apply for Tsavo East. ▪ Embedding KWS personnel to the Resident Engineer's (RE) Office to ensure that the Contractor does not operate in any way that is prejudicial to conservation of flora and fauna in Tsavo East and West.
▪ Spread of Zoonotic diseases, Gastro Intestinal parasites and other pathogens	▪ Ensuring that construction workers observe hygiene. ▪ Providing mobile toilets to workers. ▪ The worker's camps should be located outside the national Parks so as to reduce workers contact with wild animals. ▪ The workers should be educated on the need to avoid feeding wild animals and to dispose of waste appropriately.
▪ Spread of invasive species	▪ The pipeline route should be monitored and remedial action taken should this or other invasive species be noticed in along the pipeline either during the implementation or the operation stages of the project. ▪ Movement of soil for service road construction will be limited to avoid spreading invasive species. ▪ Clean all machines and vehicles before and entering the protected areas.
▪ Accidental injury and	▪ Educating the drivers on the legal speed limits in conservation areas.

Impact	Mitigation measures
deaths of wild animals	▪ Laying the pipeline and covering the trenches within the shortest time possible. ▪ Limiting the time of open trenches in the park to maximum 24 hours and a length of not more than 200 metres each day. ▪ Adherence to Parks Rules and Regulations.
▪ Occupational accidents	▪ Traffic department should approve crossing plan prior to construction, and should approve obstruction times during construction. ▪ Access of residents should be facilitated by installing appropriate temporary bridges over the pipeline trenches. ▪ Suitable warning signs should be placed at near locations and should be visible at night. ▪ A guard should be available 24 hours to help people access across pipeline trenches. ▪ Alternatives access ways should be communicated to the community ▪ Provide Marshalls to assist the elderly, school children, expectant mothers and Persons With Disability (PWDs) cross the trenches. ▪
▪ Disturbance of traffic and difficulty of access	▪ Traffic department should approve crossing plan prior to construction, and should approve obstruction times during construction. ▪ Access of residents should be facilitated by installing appropriate temporary bridges over the pipeline trenches. ▪ Suitable warning signs should be placed at near locations and should be visible at night. ▪ A guard should be available 24 hours to help people access across pipeline trenches. ▪ Alternatives access ways should be communicated to the community ▪ Provide Marshalls to assist the elderly, school children, expectant mothers and Persons With Disability (PWDs) cross the trenches. ▪
▪ Risks of Damaging Underground Infrastructure	▪ Collecting available maps for infrastructure routes. ▪ Excavating manual trial pits to locate the underground infrastructure facilities before using mechanical excavation. ▪ Notify the relevant service provider in-case of accidental damage. ▪ Prompt repairs to minimise the duration of interruption of services.

Impact	Mitigation measures
▪ Effects on Structural Integrity	▪ The geotechnical report should include suitable measures for confining vibrations within project sites. These measures should be tailored according to the proximity of buildings to the project sites and earthwork program. ▪ These recommendations identified in the geotechnical report (such as secant piling or sheet piling or establish cut-off walls) should be implemented by the contractor and supervised by Environment Health and Safety Advisor. ▪ No blasting should take place while excavating in built up areas. ▪ Use manual excavations as much as is practicable. ▪
▪ Chemical Exposure	▪ Material safety data sheets of all chemicals used during construction will be kept in a register by the contractor ▪ The contractor to have procedures in place regarding emergencies relating to chemicals and dangerous goods consistent with the existing legislation. ▪ Records will be kept on the existing inventory, storage location, personnel training and disposal of waste for all chemicals and dangerous goods used on site ▪ All relevant construction workers will be trained in appropriate handling, storage and containment practices for chemicals and dangerous goods in relation to their position. ▪ All spills will be cleaned immediately
▪ Liquid Effluents from Contractor's camps	▪ Provision shall be made for employee facilities including shelter, toilets and washing facilities. ▪ Toilet facilities supplied by the contractor for the workers shall occur at a minimum ratio of 1 toilet per 30 workers (preferred 1:15). ▪ The exact location of the toilets shall be approved by the Public Health Department prior to establishment. ▪ Sanitation facilities shall be located within 100m from any point of work, but not closer than 50 m to any water body. ▪ All temporary/portable toilets shall be secured to the ground to prevent them toppling due to wind or any other cause. ▪ The contractor shall ensure that the entrances to toilets are adequately screened from public view. ▪ Only approved portable toilets should be used. ▪ These facilities shall be maintained in a hygienic state and serviced regularly. Toilet paper shall be provided

Impact	Mitigation measures
	▪ The contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from site to an approved disposal site. ▪ Discharge of waste from toilets into the environment and burying of waste is strictly prohibited. ▪ Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas, which include groundwater, are not polluted. ▪
▪ Solid Wastes	▪ Integrated wastes management. ▪ The contractor should segregate hazardous waste, which will be safely transported to a hazardous waste facility, from non-hazardous waste which will be transported to approved disposal sites by NEMA. ▪ Garbage collected from construction sites should be disposed at appropriate sites approved by NEMA. ▪ Inert construction wastes should be appropriately collected and disposed in approved disposal site. ▪ Sell metal to authorized scrap metal dealers
▪ Population Displacement	▪ Prepare a Resettlement Action Pan (RAP) with: i. A comprehensive census of Project Affected Persons (PAPs). ii. Asset Inventory of the PAPs. iii. Cutoff dates that are reasonable. iv. Compensation rates, procedure and Schedule v. Grievance Redress Mechanisms.
▪ Risk of Fire outbreak	▪ Construction camps to located outside the protected areas. ▪ Label all inflammable materials and sore them appropriately ▪ Provision of adequate firefighting equipment capable of fighting all classes of fire ▪ Put " No Smoking Signs" in areas where inflammables are stored ▪ Train workers on the use of ire fighting equipment ▪ Label fire exits and keep them clear. ▪ Display a list of emergency contact numbers prominently
▪ Spread of HIV and AIDS	▪ Sensitize the migrant workers and host community on risky sexual behaviour. ▪ Have VCT services on site and encourage workers to undergo the same.

Impact	Mitigation measures
	▪ Provision of protective devices such as condoms. ▪ Ensure project is completed within the set timeframe to minimize the contact.
▪ Social and cultural conflicts	▪ Sensitize migrant workers on key cultural sensitivities of the host community. ▪ Ensure fairness in recruitment of workforce by ensuring that local people get priority of the jobs that they can perform. ▪ Create open communication for people to channel their grievances to avoid rumours and fake news with respect to the proposed project. ▪ Engage with local leaders at all times. ▪ Create a project committee with representation of all actors.
▪ Risk of over abstraction of water from Mzima springs	▪ Strengthen water intake monitoring ▪ Increase the quantity of rainfall stations, especially in the ridge area ▪ Strengthen the discharge monitoring of Mzima Springs and other major springs that have Chyulu aquifer as the water source. ▪ Proponent to work with stakeholders in order to secure Mzima Springs catchment areas. ▪ Proponent should work with appropriate stakeholders and develop a payment for ecosystem service scheme in which the users of water from Mzima Springs pay for the conservation and protection of the spring's water catchment.
▪ Reduced water volume for wild animals	▪ Proponent should consider constructing extra water line and watering points/troughs to discourage overconcentration of animals in Mzima springs during the dry seasons. ▪ Abstract only the licensed volume from the springs. ▪ Encourage development of other water sources downstream such as dams to harvest rain water.

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1.0 INTRODUCTION

1.1 Background

There is a growing concern in Kenya and at global level that many projects are causing damage to the environment. Activities carried out to realize the said projects have the potential to damage the natural resources upon which the economies are based if preventive measures are not put in place. A major challenge globally and nationally today is how to balance development objectives and ecological concerns. To achieve this balance, various environmental management tools have been developed. Environmental Impact Assessment (EIA) is among the many tools for the protection of the environment from the negative effects of development activities. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound.

In Kenya, EIA became compulsory after the enactment of Environmental Management and Coordination Act (EMCA) (Revised, 2015). According to, EMCA, and its subsequent Environmental (Impact and Audit) Regulations, 2003, it is mandatory to get environmental clearance for all projects in the Second Schedule of EMCA. Among these projects are; rivers and water resources development and waste disposal projects including:

ix. *Storage projects, barrages and piers;*
x. *Rivers diversions and water transfers between catchments; flood control schemes;*
xi. *Drilling for the purpose of utilizing ground water resources including geothermal energy.*
xii. *Sites for hazardous waste disposal;*
xiii. *Sewage disposal works;*
xiv. *Works involving major atmospheric emissions;*
xv. *Works emitting offensive odours;*
xvi. *Sites for solid waste disposal.*

(EMCA, 1999, Second Schedule; Part IV.)

The proposed Mzima II pipeline for water transmission from Mzima springs thus falls under projects which must undergo an environmental impact assessment before implementation.

The EIA is based on predictions. It attempts to predict the changes in environmental quality which would result from the interaction between proposed project activities and the environment in its totality (Biophysical, socio-cultural, economic and political). The EIA attempts to weigh environmental effects on a common basis with economic costs and benefits and finally it is a decision-making tool. The EIA is a procedure used to examine the environmental consequences, both beneficial and adverse, of a proposed development project and to ensure that these effects

are taken into account in project design. EIA should be viewed as an integral part of the project planning process.

1.2 The Proponent

Coast Water Services Board (CWSB) hereafter referred to as the Proponent, is one of the eight regional Water Services Boards that were created to bring about efficiency, economy and sustainability in the provision of water and sewerage services in Kenya following the operationalisation of the Water Act 2002. It is a state corporation under the Ministry of Water and Irrigation. The Coast Water Services Board (CWSB) was gazetted on the 27th February, 2004. In July 2005, Coast Water Services Board received its mandate for the provision of water and sewerage services in Coast Region. The core business of the Board is to ensure efficient and effective delivery of affordable quality water and sanitation services to all residents in Coast Province.

CWSB's main functions are:-

- Ownership and holding of water and sewerage assets
- Planning, development and expansion of water and sewerage infrastructure
- Contracting out water and sewerage service provision to water service providers also referred to as water companies
- Monitoring water and sewerage services provision in its area of jurisdiction

1.3 The Proposed Project

To have a clear understanding of the proposed project, a brief understanding of the existing 60 year old Mzima I pipeline is necessary.

1.3.1 Mzima I Pipeline

The existing Mzima pipeline (Mzima I) was constructed in the 1950's. The source work comprise of a metal sheet pile driven to impervious regolith loams with a cut of trench before the hippo pool to a collection chamber. The intake consists of a 672 m long subsurface weir, at an elevation of 684.58 m at the top. From the intake chamber approximately 1.1 m^3/s of water gravitates to an overflow chamber located some 1,300 m downstream. At the overflow chamber some 0.7 m^3/s is returned to the Mzima River system discharging into the Hippo Pool and to the upper end of the Long Pool leaving o.4m^3/s to flow through Mzima 1 pipeline. The source work comprise of the following:

a) 30" (762 mm) pipeline extending for 1,300 m, from the springs to the collection chamber along the southern end of the Hippo and Long Pools to the first tunnel inlet
b) Overflow chamber, some 1,300 m from the intake

The head works comprise of the following:

1. Tunnel, 100 m long with a rectangular cross-section (1,067 mm×1,829mm) and a semi-circle of radius of 534 mm top.
2. A diameter of 48" (1,219 mm ID) pipe and running 200m
3. A second tunnel, 950 m long with a cross-section identical to the first tunnel.

Mzima I pipeline is 218.5km and water flow by gravity from the sources works to Mazeras tanks. It has capacity to transfer 35,000m^3/day (4M^3/s) this is insufficient and due to its age it has serious leakage problems.

1.4 The Proposed Mzima II Pipeline

The design adopts the 2013 Coastal Water Supply Master Plan and aims at implementing the Mzima II Pipeline component and decommission the existing Mzima Pipeline once the new pipeline is completed. The pipeline will be constructed parallel to the existing pipeline with Mzima I.

The Project involves funding, design and construction of 220km of diameter 1,200mm pipeline and related appurtenances capable of transmitting 105,000m3/d of water from Mzima Springs to various coastal region towns in Taita Taveta, Kwale, Kilifi and Mombasa Counties.

1.4.1 The Project components

The project shall comprise of the headwork, the intake, the main water supply pipeline, Break pressure tanks, water supply along the pipeline route and water delivery to the terminal tanks at Mazeras. The following section describe the work at each section

1.4.2 The source and head works

Design analysis found out that the existing waterworks at Mzima Springs have a capacity to abstract the required 1.22 M^3/s, the bottleneck to transfer this amount is the existing

30"(762 mm), 1,300 m long pipeline between the intake and the overflow chamber. Table 1 is a summary of the work to be done at the intake and head works.

Table 1: Works at head and intake works

Item no.	Component	Magnitude	Work required
1	30 Inch (760mm dia)	1,300m	Replace with 1200mm diameter
2	Overflow chamber	1	Replace
3	1st Tunnel	100m	Retain as it is
4	48 Inch (1200mm dia)	200	Replace with 1400mm dia, ductile iron pipe
5	2nd Tunnel	950m	Adequate

The work is illustrated by figure 1

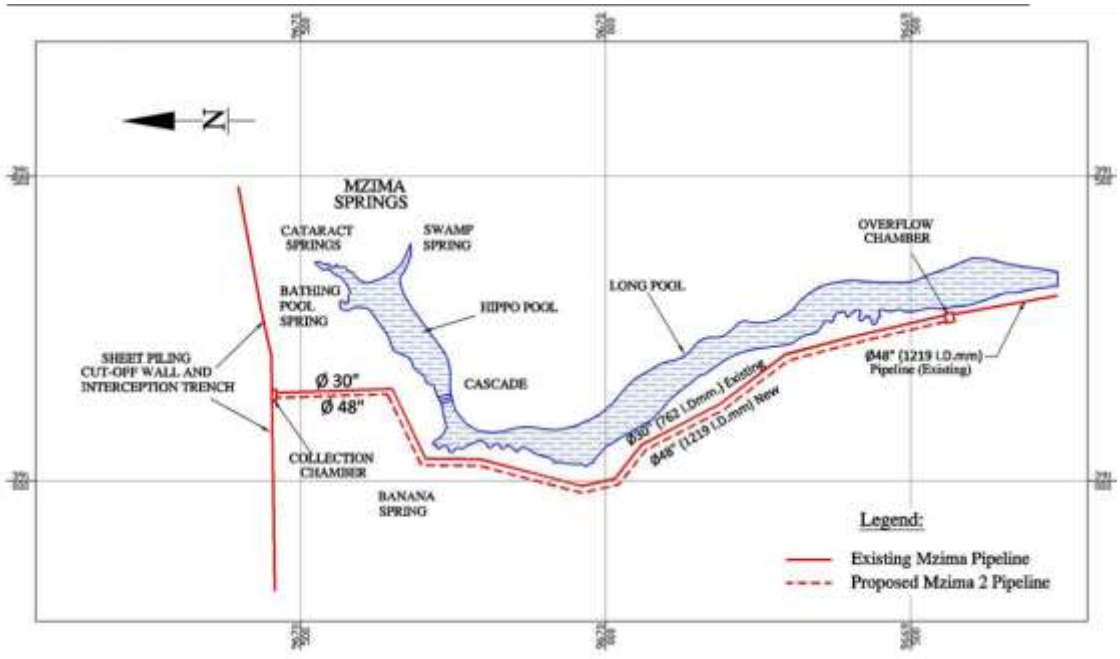

Figure 1: Construction at intake and headworks

1.4.3 The Transmission Pipeline

The pipeline from Mzima headwork to the existing control chamber of reservoirs in Mazeras, includes line valves, air valves, washout valves, and regulating valves. Considering the physical characteristics, construction convenience, anticorrosion capacity, safe operation requirement, repair conditions and investment cost and combining the factors such as the project scale, pipe sizes, working pressure, geological conditions, terrain, loading requirement, construction conditions, construction time, ductile

iron pipe is selected as the pipe material as the main pipeline. Mild steel pipe shall be used for crosses barriers such as railways, roads and rivers. The recommended protective measures for both steel and Ductile Iron components are specified in the detailed technical report. The pipe diameters for construction area DN1400, DN1200, DN1000, DN900; the total length of transmission pipeline is 219.4km.

Table 2: Works components and operations at various sections of the proposed project

System Component	DI Pipe specifications	Length (km)	Chlorination site
Source works (Between the intake and tunnel inlet chamber)	DN1200	2.1	-
Headworks chamber to BPT1	DN1400	9.9	X
	DN1200	30.7	
	15m×13m×2m, 400m^3		
BPT1 to BPT2 (Voi Junction)	DN1400	15.4	X
	DN1200	23.8	
	15m×15m×5m×2, 1125m^3× 2 (tanks)		
BPT2 (Voi Junction) to BPT3	DN1000	1.7	-
	DN700	8.0	
	15m×13m×2m, 400m^3		
BPT3 to BPT4	DN900	18.8	-
	DN700	1.9	
	15m×13m×2m, 400m^3		
BPT4 to BPT5	DN900	24.5	-
	15m×13m×2m, 400m^3		
BPT5 to BPT6	DN900	4.4	-
	DN800	5.3	
	15m×13m×2m, 400m^3		
BPT6 to BPT7	DN1000	9.4	-
	DN900	5.5	
	15m×13m×2m, 400m^3		
BPT7 to BPT8	DN900	13	-
	DN800	8.9	
	15m×13m×2m, 400m^3		
BPT8 to BPT9	DN900	9.1	
	15m×13m×2m, 400m^3		
BPT9 to Mariakani Junction	DN900	12.9	X

System Component	DI Pipe specifications	Length (km)	Chlorination site
	15m×15m×5m×2, 1125m³× 2 (tanks)		
Mariakani junction to BPT10	DN900	2.2	-
	DN800	3.3	
	15m×13m×2m, 400m³		
BPT10 to Mazeras Reservoir	DN900	6.5	X
	DN800	3.0	
	15m×13m×2m, 400m^3		
Crosses A109 highway twice	DN1200 pipeline		
Crosses railway twice	DN1200 pipeline		
Crosses a river with 20m width once	DN900 pipeline		
Crosses a river with 25m width twice	DN800 pipeline		

1.4.4 Break Pressure Tank (BPT)

Reinforced Concrete Break Pressure Tanks with volume of 400m^3 are design to regulating pressure along the pipeline and also provides safety in case of pipe burst as valves limit the discharge. A total of 10 BPTs are designed along the pipeline, each station includes 2 (twin) break pressure tanks, two float valves installed at the inlet of each tank to regulate the water level and flow meter installed at the outlet of break pressure tank.

1.4.5 Disinfection Facilities

Rehabilitating and upgrade of the existing disinfection facility to cope with the increased abstraction is considered. For urban use, chlorination and disinfection will always be a "must" before supplying portable water to consumers.

1.4.6 Access Road

The proposed pipeline will be parallel to the existing one. The service road of the existing pipeline is in bad condition, rehabilitation shall be required for the construction of the proposed pipeline. The existing 30m reserve will be adequate for the new pipeline and access road.

1.4.7 Consideration of water off-takes

The new 219.4km pipeline aims at conveying 105,000 m³/day of water at its ultimate design period (2035) from Mzima Springs to various coastal counties as summarized below.

Table 3: Supply of water enroute to Mombasa

County	Town	Amount m^3/day	Supply system
Taita Taveta	Voi/Maungu	16358	Pumping
	Mwatate	4665	
	Wundanyi	4777	
Kilifi	Mariakani	10150	

The balance of 59,050m^3 per day shall be supplied to the city of Mombasa. Figure 2 illustrates the whole project operation.

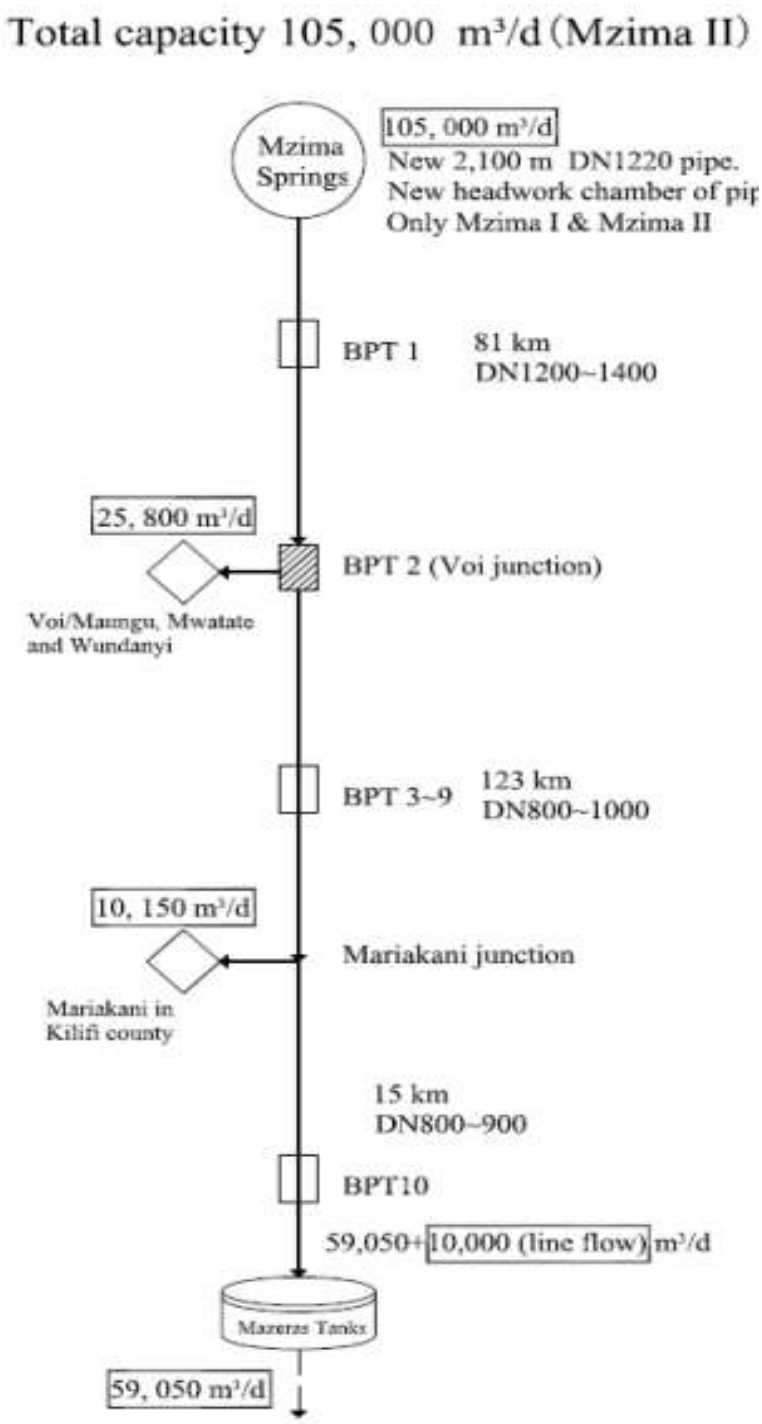

Figure 2: Schematic representation of the Mzima II pipeline

1.5 Analysis of Alternatives

I. The 'No action' alternative (Maintain Mzima I Pipeline)

From a biophysical environmental perspective, this may be the best option. Without the development, the area (especially the Mzima springs and the Tsavo West national Park) would remain a relatively undisturbed area providing a habitat for the varied flora and fauna presently observed. This area will continue to be impacted, although minimally, by anthropogenic and natural factors. From a socio-economic perspective the "No action" alternative may not be the best alternative as the numerous benefits to be gained from the development both locally and nationally would not be realised and the resources in the area would continue to be underutilized. The "No Action Alternative" would mean retaining the old Mzima I pipeline. This pipeline has outlived its design life, is characterized by bursts and leaks. This is in turn accompanied by massive losses of water, frequent interruptions of water supply which exposes the citizens in the affected areas to untold suffering. This alternative which would maintain the status quo is thus not the best.

II. Construct Mzima II while maintaining Mzima I

This alternative would entail constructing a new pipeline to augment the existing one. Essentially, Mzima 1 will remain operational while Mzima II would run parallel. This alternative falls because Mzima I is old and dilapidated. The costs of maintaining it far outweighs the benefits of maintaining it. It is better decommissioned than rehabilitated.

III. The Preferred Alternative (Constructing Mzima II pipeline and decommission Mzima I)

This entails implementing Mzima II water pipeline project as described in section 1.4 (Above). The benefits are enormous which include but not limited to:

- Adequate water supply to populations along the corridor.
- Reduced water wastage.
- Easier maintenance since pipes to be used are made of ductile iron.

1.6 The Objectives of this EIA

- To describe the proposed development project;
- To describe the legislative and regulatory considerations associated with the project;
- To describe the present status of the environment on the project site;
- To describe the present status of the socio-economic attributes of the project site;

- To identify and predict any potential positive, negative, reversible, irreversible, short and long term impacts, as well as any cumulative and synergistic environmental and socio-economic impacts that may arise from the project;
- To assess the hazards associated with the development;
- To facilitate mitigation of possible negative impacts caused by the proposed development;
- To recommend measures to enhance any positive impacts identified;
- To outline possible alternatives to the project; and
- To outline a suitable environmental management and monitoring plan for the

2.0 ENVIRONMENTAL IMPACT ASSESSMENT APPROACH AND METHODOLOGY

2.1 Introduction

Having understood the scope of work presented by the Client, the Consultant undertook the task of EIA for proposed project by clearly defining the assignment into a number of discrete activities. These activities facilitated development of a workable framework for the speedy and timely execution of the assignment. The EIA study was conducted in accordance with the Terms of Reference provided in the Environmental (Impact Assessment and Audit) Regulations, 2003.

To adequately address the environmental issues emanating from the implementation of the proposed project, the Consultant carried out environmental study in the entire project area. The project covers the source of water all the way to the reservoirs. The environmental impact assessment study comprised the following activities: mobilization, consultation with stakeholders, a screening and scoping exercise, desk and field studies, data analysis, impact identification, and analysis of health and safety issues associated with the proposed project.

2.2 Mobilization, Liaison and Consensus Building with Stakeholders

The Consultant liaised with all the relevant stakeholders in the project area. This facilitated consensus building and enabled all the stakeholders to understand the scope of work. Consultation and consensus continued through all the phases of this consultancy so as to get all the stakeholders on board with a view of coming up with the most accommodating and viable option.

2.3 Scoping Exercise

A scoping exercise was conducted to identify cardinal issues that were addressed during the EIA Study. A simple checklist of anticipated impacts was used to guide the scoping exercise. Key issues were also picked during the Public consultation meetings and interviews with Lead Agencies Representatives.

2.4 Terms of Reference (TOR)

The study was carried out in line with the TOR developed by the EIA Team in keeping with the EIA/EA Regulations 2003.

2.5 Desk Study

Following the completion of the scoping exercise the Consultant embarked on a desk study in order to gather environmental information of the project area. Document Analysis approach was employed to obtain relevant information on the political, social, economic and biophysical characteristics of the project area and its environs. Project designs reports and plans, Government of Kenya Reports, maps, district development plans, State of Environment Reports, were the key documents utilized towards this end.

2.6 Field Study

Review of available information of the project area during the desk study revealed information gaps and the Consultant arranged for a field study. An extensive field survey was carried out to obtain baseline data to complement information gathered during the desk study. In addition, land use and other environmental attributes likely to be affected by the project activities were assessed.

To collect data during the field study, a constellation of methods were used. These include:

- Unstructured Observation
- Key informants' interviews,
- Collection of water and air samples for analysis. (Appendix 15, and Appendix 16).
- Noise measurement (Appendix 17).

2.7 Public Consultation

In conforming to the environmental legislation, Interested and Affected Parties (I&AP's) were consulted. To elicit information form the various "Publics", different methods were employed. This is because data needed varied from stakeholder to another thus calling for variance in consultation method.

i. An Open House (Baraza): This method is effective in that it gives an even stimulus in the information passed. It also provides an opportunity to know the community mood as far as the proposed project is concerned. In addition it is possible to know whether the public is united or Divided as far as the proposed project is concerned. In areas of low literacy, such as the project area, this is the most preferred approach as opposed to questionnaires. Views were recorded as minutes for the meeting. There was support for the proposed Mzima II that emanated from awareness among the public. They appreciated the need for the proposed project.

ii. Key Informants' Interviews: These targeted Lead Agency representatives and other Institutional stakeholders. The speciality in their different areas of operation called for candid engagements which could only be achieved through close interactions.
iii. Phone Interviews: This was employed to consult Key Informants who were not available for Direct Interviews due to their engagements during the EIA study.
iv. Questionnaires: They were employed during the Household Survey

3.0 RELEVANT LEGISLATIVE AND POLICY FRAMEWORKS

3.1 Introduction

There are a number of pertinent laws relating to environmental protection that are applicable to any development and that a developer will need to be aware of when embarking on a particular type of development. There are also several statutory agencies that have powers to control certain types of development that have the potential to affect the environment. These powers of control are typically exercised through a system of permits that induce checks and balances on what kind and form of development can occur.

A developer therefore must be prepared to present, explain, and in some cases alter an aspect of a proposal in order to comply with the permitting requirements. This section is therefore intended as a guide to the relevant permitting requirements that deal with the environmental impacts of this proposed development and the agencies to which they relate as well as presents other legislation and regulations, which are applicable to the development.

The prime purpose of this section is to provide the proponent with quick reference to the critical legal and policy provisions to enable proper planning and impact assessment during project planning and implementation. Environmental Management and Coordination Act (EMCA) (Amended 2015) is the principle law of environmental management. This framework law guarantees every Kenyan the right to a clean and healthy environment.

3.2 The Constitution of Kenya

The provisions of Chapter IV (Protection of Fundamental Rights and Freedoms of The Individual) protects citizens from deprivation of property. No property of any description shall be compulsorily taken possession of, and no interest in or right over property of any description shall be compulsorily acquired, except where it is necessary for public interest. Every person has also the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures.

Chapter V (Land and Environment) of the Constitution gives provisions of protecting land, environment and natural resources. The State is required to:—

- Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;

- Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;
- Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;
- Encourage public participation in the management, protection and conservation of the environment;
- Protect genetic resources and biological diversity;
- Establish systems of EIA, environmental audit and monitoring of the environment;
- Eliminate processes and activities that are likely to endanger the environment; and
- Utilize the environment and natural resources for the benefit of the people of Kenya.
- Every person has a legal duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

3.3 Institutional Framework

There exists a host of institutions, which deal with environmental issues in Kenya. Some of the key institutions include National Environmental Management Authority (NEMA), the Department of Resource Surveys and Remote sensing (DRSRS), the Water Resources Management Authority (WRMA), The Kenya Forest Service (KFS), the Kenya Wildlife Service (KWS) the Kenya Forestry Research Institute (KEFRI), the National Museums of Kenya (NMK), the Kenya Marine and Fisheries Research Institute (KEMFRI), the Kenya Agricultural and Livestock Research Organisation (KARLO) among others. There are also local and international NGOs involved in environmental issues in the country.

3.3.1 National Environmental Management Authority (NEMA)

The object and purpose for which NEMA is established is to exercise general supervision and co-ordinate over all matters relating to the environment and to be the principal instrument of the government in the implementation of all policies relating to the environment.
The functions of the Authority include among others to:

- Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plan, programmes and projects with a view to ensuring the proper management and rational utilization of the environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya.
- Take stock of the natural resources in Kenya and their utilization's and consultation, with the relevant lead agencies, land use guidelines.

- Examine land use patterns to determine their impact on the quality and quantity of the natural resources.
- Carry out surveys, which will assist in the proper management and conservation of the environment.
- Advise the government on legislative and other measures for the management of the environment or the implementation of relevant international conservation treaties and agreements in the field of environment as the case may be.
- Advise the government on regional and international environmental convention treaties and agreements to which Kenya should be a party and follow up the implementation of such agreements where Kenya is a party.
- Undertake and co-ordinate research, investigation and surveys in the field of environment and collect and disseminate information about the findings of such research, investigation or survey.
- Mobilize and monitor the use of financial and human resources for environmental management.

3.3.2 National Environment Action Plan Committee

This Committee is responsible for the development of a 5-year Environment Action Plan among other things. The National Environment Action Plan shall:

- Contain analysis of the Natural Resources of Kenya with an indication as to any pattern of change in their distribution and quantity over time.
- Contain analytical profile of the various uses and value of the natural resources incorporating considerations of intergenerational and intra-generational equity.
- Recommend appropriate legal and fiscal incentives that may be used to encourage the business community to incorporate environmental requirements into their planning and operational processes.
- Recommend methods for building national awareness through environmental education on the importance of sustainable use of the environment and natural resources for national development.
- Set out operational guidelines for the planning and management of the environment and natural resources.
- Identify actual or likely problems as may affect the natural resources and the broader environment context in which they exist.
- Identify and appraise trends in the development of urban and rural settlements, their impact on the environment, and strategies for the amelioration of their negative impacts.
- Propose guidelines for the integration of standards of environmental protection into development planning and management.

- Identify and recommend policy and legislative approaches for preventing, controlling or mitigating specific as well as general diverse impacts on the environment.
- Prioritise areas of environmental research and outline methods of using such research findings.

3.4 Environmental Management and Co-ordination Act (EMCA) (Amended 2015)

Environmental Management and Co-ordination Act) (Amended 2015), is the principle statute providing legal and institutional framework for the management of all environment related matters in Kenya. It is the framework law on environment, which was enacted on the 14th of January 1999 and commenced in January 2002. The Act is the legislation that governs EIA studies. The Proponent carried out an ESIA as per the second schedule of this act. The proposed project is cited in the Second Schedule of EMCA as requiring an EIA License before commencement. The Act provides for the National Environmental Management Authority (NEMA) whose objective and purpose is to exercise general supervision and coordination over all matters relating to the environment and to be the principal instrument of the Government in the implementation of all policies relating to the environment.

Following the *Gazettement* of Environmental (Impact Assessment and Audit Regulations), (2003), the submission of environmental impact assessment reports became mandatory. According to these regulations no proponent shall implement a project likely to have adverse environmental impact or for which an EIA has not been concluded and approved in accordance with these regulation. This proposed Mzima II Pipeline Project falls within Schedule 2 of EMCA and therefore requires an EIA is required.

In a bid to comply with the Act and these Regulations, Proponent has commissioned the EIA. The Proponent shall be required to commit to implementing the environmental management plan laid out in this report and any other conditions laid out by NEMA, prior to being issued an EIA license.

To operationalize EMCA, various Regulations have been gazetted over the years. These Regulations touch on different components of the environment and they include:

3.4.1 Environmental Impact Assessment and Audit Regulations, 2003

Environmental Impact Assessment (EIA) is a critical examination of the effects of a project on the environment. The goal of an EIA is to ensure that decisions on proposed projects and activities are environmentally sustainable. An EIA is conducted in order to identify impacts of a project on the environment, predict likely changes on the environment as a result of the development, evaluate the impacts of the various alternatives on the project and propose mitigation measures for the potential significant negative impacts of the project on the environment.

The EMCA, requires that during the EIA process a proponent shall in consultation with the Authority seek views of persons who may be affected by the project or activity through posters, newspaper, radio and hold at least three public meetings with the affected parties and communities. The Project proponent pays for the entire EIA process.

Conversely, Environmental Audit (EA) is the systematic documentation, periodic and objective evaluation of activities and processes of an ongoing project. The goal of EA is to establish if proponents are complying with environmental requirements and enforcing legislation. The purpose of EA is to determine the extent to which the activities and programs conform to the approved environmental management plan. A comprehensive EA ensures a safe and healthy environment at all stages of project operations and decommissioning.

This report complies with the requirements of the Environmental Regulations in the coverage of environmental issues, project details, impacts, legislation, mitigation measures, management plans and procedures. The Proponent shall be required to commit to implementing the environmental management plan laid out in this report and any other conditions laid out by NEMA.

3.4.2 Water Quality Regulations, 2006 (Legal Notice No. 121)

Water Quality Regulations apply to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources.

The objective of the regulations is to protect human health and the environment. The effective enforcement of the water quality regulations will lead to a marked reduction of water-borne diseases and hence a reduction in the health budget. The regulations also provide guidelines and

standards for the discharge of poisons, toxins, noxious, radioactive waste or other pollutants into the aquatic environment in line with the Third Schedule of the regulations. The regulations have standards for discharge of effluent into the sewer and aquatic environment. While it is the responsibility of the sewerage service providers to regulate discharges into sewer lines based on the given specifications, NEMA regulates discharge of all effluent into the aquatic environment. Everyone is required to refrain from any actions, which directly or indirectly cause water pollution, whether or not the water resource was polluted before the enactment of the Environmental Management and Coordination Act (EMCA) Gazetted in 1999. It is an offence to contravene the provisions of these regulations with a fine not exceeding five hundred thousand shillings.

The Proponent shall ensure that the entire project lifecycle (Pre-construction, construction, operation and decommissioning) of Mzima II complies with these regulations to ensure that integrity of water is maintained.

3.4.3 Waste Management Regulations, 2006 (Legal notice No. 121)

The Environmental Management and Coordination (Waste Management) Regulations, 2006 are meant to streamline the handling, transportation and disposal of various types of waste. The aim of the Waste Management Regulations is to protect human health and the environment. Currently, different types of waste are dumped haphazardly posing serious environmental and health concerns. The regulations place emphasis on waste minimization, cleaner production and segregation of waste at source.

The Proponent shall:

- ***Observe the guidelines as set out in the environmental management plan laid out in this report as well as the recommendation provided for mitigation /minimization /avoidance of adverse impacts arising from the Project activities.***
- ***Engage licensed waste handlers to deal with various categories of wastes that m might be generated in the entire lifecycle of the project.***
- ***Apply for necessary permits for handling wastes (solid and liquid)***
- ***Since solid waste management is a devolved function, the Proponent shall Collaborate with the respective County Governments in addressing waste matters related to the proposed project***

3.4.4 Controlled Substances Regulations, 2007 (Legal Notice No.73 of 2007)

The Controlled Substances Regulations defines controlled substances and provides guidance on how to handle them. This regulation mandates NEMA to monitor the activities of persons handling controlled substances, in consultation with relevant line ministries and departments, to

ensure compliance with the set requirements. Under these regulations, NEMA will always be publishing a list of controlled substances and the quantities of all controlled substances imported or exported.

The list will also indicate all persons holding licenses to import or export controlled substances, with their annual permitted allocations. The regulations stipulate that controlled substances must be clearly labeled with among other words, "Controlled Substance-Not ozone friendly'') to indicate that the substance or product is harmful to the ozone layer. Advertisement of such substances must carry the words, "Warning: Contains chemical materials or substances that deplete or have the potential to deplete the ozone layer."

Producers and/or importers of controlled substances are required to include a material safety data sheet. Persons are prohibited from storing, distributing, transporting or otherwise handling a controlled substance unless the controlled substance is accompanied by a material safety data sheet. Manufacturers, exporters or importers of controlled substances must be licensed by NEMA. Further, any person wishing to dispose of a controlled substance must be authorized by NEMA. The licensee should ensure that the controlled substance is disposed of in an environmentally sound manner. These regulations also apply to any person transporting such controlled substances through Kenya. Such a person is required to obtain a Prior Informed Consent (PIC) permit from NEMA.

3.4.5 Conservation of Biodiversity Regulations 2006

These are supposed to ensure Conservation of Biodiversity in the country because, Kenya has a large diversity of ecological zones and habitats including lowland and mountain forests, wooded and open grasslands, semi-arid scrubland, dry woodlands, and inland aquatic, and coastal and marine ecosystems. In addition, a total of 467 lake and wetland habitats are estimated to cover 2.5% of the territory. In order to preserve the country's wildlife, about 8% of Kenya's land area is currently under protection. One requires NEMA approvals is areas of rich biodiversity are going to be affected by a development project.

3.4.6 Air Quality Regulations, 2008

The objective these Regulations is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources, including as mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in the Environmental Management and Coordination Act, 1999. It also covers any other air pollution source as may be determined by the Minister in

consultation with the Authority. Emission limits for various areas and facilities have been set. The regulations provide the procedure for designating controlled areas, and the objectives of air quality management plans for these areas.

The Proponent shall observe policy and regulatory requirements and implement the mitigation measures proposed in this document in an effort to comply with the provisions of these Regulations on abatement of air pollution.

3.4.7 Noise and Excessive Vibration Pollution Control Regulations, 2009

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

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

According to regulation 3 (1), no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

Regulation 4 prohibits any person to (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 metres from any moving source. Regulation 5 further makes it an offence for any person to make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property.

- ***The Proponent shall observe policy and regulatory requirements and implement the measures proposed in this documenting an effort to comply with the provisions of the Regulations.***
- ***If need be, the Proponent will apply for relevant licenses as per this Regulations.***

3.4.8 Wetlands, River Banks, Lake Shores and Sea Shore Management Regulation, 2009

This Act applies to all wetlands in Kenya whether occurring in private or public land. It contains provisions for the utilization of wetland resources in a sustainable manner compatible with the

continued presence of wetlands and their hydrological, ecological, social and economic functions and services. The project traverses several rivers, wetlands and streams.

The Proponent shall comply with the provisions of the Act in protecting wetlands, preventing and controlling pollution and siltation of rivers.

3.4.9 Prevention of pollution in Coastal Zone and other Segments of the Environment) Regulation, 2003

The objective of these Regulations is to provide for prevention, control and abatement measures of shipping activities to ensure harmful substances or effluents are not released into the sea or ocean. The Proponent shall comply with the provisions of the regulation in protecting coastal environment.

3.5 The Water Act, 2016

The Water Act, 2002 provides the legal framework for the management, conservation, use and control of water resources and for the acquisition and regulation of right to use water in Kenya. It also provides for the regulation and management of water supply and sewerage services. In general, the Act gives provisions regarding ownership of water, institutional framework, national water resources, management strategy, and requirement for permits, state schemes and community projects. Part IV of the Act addresses the issues of water supply and sewerage. The project shall have no adverse impact on the local water supply during operations as there are no requirements for the installation of water supply and sanitation facilities on-site.

Requirements of the Act shall be observed by the Proponent especially throughout the entire project lifecycle.

3.6 Wildlife Management and Conservation Act, Cap 376

This Act provides for the protection, conservation and management of wildlife in Kenya. The provisions of this Act should be applied in the management of the project. Part III Section 13 subsection (I) stipulates that any person who not being an officer of Kenya Wildlife Service hunts any animal in a National Park shall be guilty of a forfeiture offence and liable to a fine or imprisonment. Subsection 2 of the Act likewise provides that any person who, without authorization conveys into a National Park, or being within the area thereof, in possession of, any weapon, ammunition, explosive, trap or poison, shall be guilty of a forfeiture offence. The Act provides that no person is allowed to use any aircraft, motor vehicle or mechanically propelled vessel in such a manner as to drive, stampede or unduly disturb any protected animal or game

animal. Therefore it will be prudent that the construction workforce is conversant with the provisions of this Act.

The Proponent shall implement the proposed measures in this document towards protection and conservation of wildlife in the project areas.

3.8 The Agricultural Act (Cap 318)

Legislative control over soil conversation and land development are mainly controlled within this Act, and many of the provisions can be generally applied beyond those lands suitable for agriculture. The Minister administering the Act, after concurrence with the Central Agricultural Board and consultation with the District Agricultural Committee, can impose land conservation orders on lands to control cultivation, grazing and clearing. These controls may be necessary to protect the land against soil erosion, to protect fertility, and to maintain catchments. Local authorities are generally empowered to administer these sections of the Act, and the District Agricultural Committee is entitled to make regulations relating to these controls. Agricultural Rules are prescribed under the Act, whereby vegetation clearing in steep slopes areas or adjacent watercourses, without authorization, is controlled.

3.9 Energy Act, 2006

The Energy Act 2006 became law on 2nd January 2007. The Act establishes an energy commission, which is expected to become the main policy maker and enforcer in the energy sector. With this Act, all the different aspects of energy e.g. electricity, petroleum and renewable energy are brought under one ambit unlike as was the case before.

3.10 Forest Act, 2005

The Act highlights the integration of the community on the management, utilization and conservation of forests and its resources. It prohibits wanton destruction of the forests. As hydro dams depends on good water catchments protection and management, on the upstream and around the reservoirs the enforcement of this Act will minimize the flow of sediments into the rivers which are being utilized for generation of hydro-electric power generation.

There are no formally identified forests along line routes, which will require adherence to this Act.

3.11 The Occupational Safety and Health Act, 2007

This Act applies to all workplaces where any person is at work, whether temporarily or permanently. The purpose of this Act is to secure the safety, health and welfare of persons at work, and protect persons other than persons at work against risks to safety and health arising out of, or in connection with, the activities of persons at work. Some of the areas addressed here are machinery safety, chemical safety and health and safety. Failure to comply with the OSHA, 2007 attracts penalties of up to KES 300,000 or 3 months jail term or both or penalties of KES 1,000,000 or 12 months jail term or both for cases where death occurs and is in consequence of the employer.

The EIA identifies various actions that can cause breach in safety with respect to the proposed project. Measures to avert such breaches have been identified. In addition, the Proponent has been advised on safety and health aspects, potential impacts, personnel responsible for implementation and monitoring, frequency of monitoring, and estimated cost, as a basic guideline for the management of Health and Safety issues in the proposed project.

3.12 Public Health Act 1986

The public Health Act regulates activities detrimental to human Health. An environmental nuisance is one that causes danger, discomfort or annoyance to the local inhabitants or which is hazardous to human health. The Act prohibits activities (nuisances) that may be injurious to health. The primary purpose of the Act is to secure and maintain public health. It defines nuisances on land and premises and empowers public health authorities to deal with such conditions.

Part IX, section 115, of the Act states that no person/institution shall cause nuisance or condition liable to be injuries or dangerous to human health. Section 116 requires that Local Authorities take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to be injuries or dangerous to human health.

On responsibility of the Local Authorities Part XI, section 129, of the Act states in part "It shall be the duty of every local authority to 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 district has a right to use and does use for drinking or domestic purposes. Section 130 provides for making and imposing regulations by the local authorities and others the duty of enforcing rules in respect of prohibiting use of water supply or erection of structures draining filth or noxious matter into water supply as mentioned in section 129. This provision is supplemented by section 126A that requires local authorities to develop by laws for controlling and regulating

among others private sewers, communication between drains, power lines, and sewers as well as regulating sanitary conveniences in connection to buildings, drainage, cesspools, etc. for reception or disposal of foul matter. Part XII, Section 136, states that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitates the breeding or multiplication of pests shall be deemed nuisances and are liable to be dealt with in the matter provided by this Act.

The Proponent shall observe policy and regulatory requirements and implement measures to safeguard public health and safety.

3.13 Physical Planning Act (Cap 286)

An Act of Parliament to provide for the preparation and implementation of physical development plans and for connected purposes enacted by the Parliament of Kenya Under this Act, no person shall carry out development within the area of a local authority without a development permission granted by the local authority under section 33. The local authority concerned shall require the developer to restore the land on which such development has taken place to its original condition within a period of not more than ninety days. If on the expiry of the ninety days notice given to the developer such restoration has not been affected the concerned local authority shall restore the site to its original condition and recover the cost incurred thereto from the developer.

The Proponent shall secure all mandatory approvals and permits as required by the law.

3.15 Way Leaves Act (Cap. 292)

The Act provides for certain undertakings to be constructed e.g. rail lines transmission lines, pipelines, canals, pathways etc., through, over or under any lands. This project is under the provision of the Act. Section 3 of the Act states that the Government may carry any works through, over or under any land whatsoever provided it shall not interfere with any existing building or structures of an ongoing activity. In accordance with the Act (section 4), notice will be given before carrying out works with full description of the intended works and targeted place for inspection. Any damages caused by the works would then be compensated to the owner as per section.

The proposed project will occupy the set wayleave. There will be no need to acquire more land to expand the way leave

3.16 Trust Lands Act, 2010

This Act applies to all land which for the time being is Trust land. Under Section 38, a way leave license may be granted to any person empowering him and his servants and agents to enter upon Trust land vested in the Council and to lay pipes, make canals, aqueducts, weirs and dams and execute any other works required for the supply and use of water, to set up electric power or telephone lines, cables or aerial ropeways and erect poles and pylons therefore, and to make such excavations as may be necessary for the carrying out of any such purposes, and to maintain any such works as aforesaid. However, compensation for loss of the use of land in any case where the usefulness of the land for agricultural purposes is impaired must be made before the license is awarded.

3.17 The Land Registration Act, 2012

The Land Registration Act is place to revise, consolidate and rationalize the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes. This Act applies to Subject to section 4, this Act shall apply to:
(a) Registration of interests in all public land as declared by Article 62 of the Constitution;
(b) Registration of interests in all private land as declared by Article 64 of the Constitution; and
(c) Registration and recording of community interests in land.

Section 24 states that: (a) the registration of a person as the proprietor of land shall vest in that person the absolute ownership of that land together with all rights and privileges belonging or appurtenant thereto; and (b) the registration of a person as the proprietor of a lease shall vest in that person the leasehold interest described in the lease, together with all implied and expressed rights and privileges belonging or appurtenant thereto and subject to all implied or expressed agreements, liabilities or incidents of the lease.

3.18 The Environment and Land Court Act, 2011

This Act is in place to give effect to Article 162(2) (*b*) of the Constitution; to establish a superior court to hear and determine disputes relating to the environment and the use and occupation of, and title to, land, and to make provision for its jurisdiction functions and powers, and for connected purposes.

3.19 The National Land Commission Act, 2012 (No. 5 of 2012)

Section 5 of the Act outlines the Functions of the Commission, pursuant to Article 67(2) of the Constitution as follows 5(1):-

(*a*) to manage public land on behalf of the national and county governments;
(*b*) to recommend a national land policy to the national government;
(*c*) to advise the national government on a comprehensive programme for the registration of title in land throughout Kenya;
(*d*) to conduct research related to land and the use of natural resources, and make recommendations to appropriate authorities;
(*e*) to initiate investigations, on its own initiative .or on a complaint, into present or historical land injustices, and recommend appropriate redress;
(*f*) to encourage the application of traditional dispute resolution mechanisms in land conflicts;
(*g*) to assess tax on land and premiums on immovable property in any area designated by law; and
(*h*) to monitor and have oversight responsibilities over land use planning throughout the country.

3.20 The Land Act, 2012

This is an ACT of Parliament to give effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land based resources, and for connected purposes. Part viii of this ACT provides procedures for compulsory acquisition of interests in land.
Section 111 (1) States that if land is acquired compulsorily under this Act, just compensation shall be paid promptly in full to all persons whose interests in the land have been determined. The Act also provides for settlement programmes. Any dispute arising out of any matter provided for under this Act may be referred to the Land and Environment Court for determination.

The proponent endevours to use the existing wayleave where Mzima I runs along. In case there is need for more land for Mzima II, it will be acquired in accordance with this Act.

3.21 Land Adjudication Act, 2010

This Act applies to any area of Trust land where the County in whom the land is vested so requests; and the Minister considers it expedient that the rights and interests of persons in the land should be ascertained and registered; and where the Land Consolidation Act does not apply to the area.

The Proponent will undertake a survey with extensive public consultations in the affected project area and commission a Resettlement Action Plan (RAP) study to comply with the provisions of the Act.

3.22 The Standards Act Cap 496

The Act is meant to promote the standardization of the specification of commodities, and to provide for the standardization of commodities and codes of practice; to establish a Kenya Bureau of Standards, to define its functions and provide for its management and control. Code of practice is interpreted in the Act as a set of rules relating to the methods to be applied or the procedure to be adopted in connection with the construction, installation, testing, sampling, operation or use of any article, apparatus, instrument, device or process.

The Proponent shall ensure that commodities and codes of practice utilized in the project adhere to the provisions of this Act.

3.23 Kenya Railways Corporation Act (Cap. 397), 1979

The Kenya Railways Corporation was established by an Act of Parliament (Cap 397) of the Laws of Kenya, and commenced operations on January 20, 1978. The overall mandate of the Corporation then was to provide a coordinated and integrated system within Kenya of rail and inland waterways transport services and inland port facilities. Rail transport is the second most important mode of transport in Kenya, after road transport. The nature of Kenya Railways, its operations and business are defined by this Act. Currently, operations of Kenya Railways lie on a national network of railway tracks covering a total distance of 2,778 km. The land corridor on which the rail tracks are laid belongs to Kenya Railways. Under the Vesting of Land Order of 1996 made under the Act, Kenya Railways owns the land corridor of 60 metres on for the main running line.

The proponent to work closely with the KRC where the proposed pipeline is in close proximity with the old railway line and or the Standard Gauge Railway (SGR)

3.24 Public Roads and Roads of Access Act (Cap. 399)

Sections 8 and 9 of the Act provides for the dedication, conversion or alignment of public travel lines including construction of access roads adjacent lands from the nearest part of a public road. Section 10 and 11 allows for notices to be served on the adjacent land owners seeking permission to construct the respective roads. During the construction phase of the project, access to the site areas will be required for the construction vehicles.

Where roads do not exist, the Proponent shall seek permission from the appropriate authorities to create such access during the construction phase.

3.25 Building Code 1997

The Local Government By-Laws include Building By-Laws that give the Municipalities or County Councils powers to approve building plans. Such plans are expected to provide for public buildings and factories among others. The By-Laws covers factory chimney shafts, stairs, lifts, rain water disposal, refuse disposal, ventilation of buildings, drainage, sanitary conveniences, sewers, septic and conservancy tanks, fire and means of escape in case of fire. Compliance with this Act in up scaling of power supply is necessary. 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. The code also prohibits construction of structures or buildings on sewer lines and under power lines.

This Act will apply to the Contractor's yard and some staff housing facilities.

3.26 Penal Code Cap 63

Section 191 of the penal code states that if any person or institution that voluntarily corrupts or foils water from public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons /institution, dwelling or business premises in the neighbourhood or those passing along public way, commit an offence.

The Proponent shall observe the guidelines as set out in the environmental management and monitoring plan laid out in this report as well as the recommendation provided for mitigation/ minimization/ avoidance of adverse impacts arising from the project activities.

3.27 The Antiquities and Monuments Act, 1983 Cap 215

The Act aims to preserve Kenya's national heritage. Kenya is rich in its antiquities, monuments and cultural and natural sites which are spread all over the country. The National Museums of Kenya is the custodian of the country's cultural heritage, its principal mission being to collect, document, preserve and enhance knowledge, appreciation, management and the use of these resources for the benefit of Kenya and the world. Through the National Museums of Kenya many of these sites are protected by law by having them gazetted under the Act.

The proponent will ensure the cultural sites near or along the proposed Mzima II pipeline are preserved. If there any chance finds, further excavations will cease and NMK will be notified immediately

3.28 World Bank Safeguards Triggered by the Project

3.28.1 Environmental Assessment OP 4.01

This policy requires Environmental Assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making. The EA is a process whose breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the proposed investment. The EA process takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and cultural property) and trans boundary and global environmental aspects.

The World Bank assigns a project to one of three project categories, as defined below:

i. Category "A" Projects

An EIA is always required for projects that are in this category. Impacts are expected to be 'adverse, sensitive, irreversible and diverse with attributes such as pollutant discharges large enough to cause degradation of air, water, or soil; large-scale physical disturbance of the site or surroundings; extraction, consumption or conversion of substantial amounts of forests and other natural resources; measurable modification of hydrological cycles; use of hazardous materials in more than incidental quantities; and involuntary displacement of people and other significant social disturbances.

ii. Category "B" Projects

Although an EIA is not always required, some environmental analysis is necessary. Category B projects have impacts that are 'less significant, not as sensitive, numerous, major or diverse. Few, if any, impacts are irreversible, and remedial measures can be more easily designed.' Typical projects include rehabilitation, maintenance, or upgrades, rather than new construction.

iii. Category "C" Projects

No EIA or other analysis is required. Category C projects result in negligible or minimal direct disturbance of the physical environment. Typical projects include education, family planning, health, and human resource development.

The proposed Mzima II project has been assigned a Category A and thus the current EIA.

3.28.2 Involuntary Resettlement (OP 4.12)

The objective of this policy to avoid where feasible, or minimize, exploring all viable alternative project designs, to avoid resettlement. This policy is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts.

This policy covers direct economic and social impacts that both result from Bank- assisted investment projects, and are caused by (a) the involuntary taking of land resulting in (i) relocation or loss of shelter; (ii) loss of assets or access to assets, or (iii) loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or (b) the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons.

The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to project appraisal of proposed projects. The objective of this policy to avoid where feasible, or minimize, exploring all viable alternative project designs, to avoid resettlement. The policy requires the displaced persons and their communities, and any host communities receiving them, are provided timely and relevant information, consulted on resettlement options, and offered opportunities to participate in planning, implementing, and monitoring resettlement. Appropriate and accessible grievance mechanisms are established for these groups. In new resettlement sites or host communities, infrastructure and public services are provided as necessary to improve, restore, or maintain accessibility and levels of service for the displaced persons and host communities.

This policy is triggered when a project activity causes the involuntary taking of land and other assets resulting in:

i. Relocation or loss of shelter,
ii. Loss of assets or access to assets,
iii. Loss of income sources or means of livelihood, whether or not the affected persons must move to another location,
iv. Loss of land,

The project will utilize the existing way leaves alongside Mzima I. Thus, no private land will be acquired compulsorily.

3.28.3 Bank Operational Policy 4.11-Physical Cultural Resources

The objective of this policy is to assist in preserving physical cultural resources (PCR) and avoiding their destruction or damage. PCR includes archaeological, paleontological, architecturally significant, and religious sites including graveyards, burial sites, and sites of unique natural value.

Initial indications are that no observed physical or cultural resources will be affected by the project. Nevertheless, the Contractor is responsible for familiarizing themselves with the following "Chance Finds Procedures", in case culturally valuable materials are uncovered during excavation, including:

i. Stop work immediately following the discovery of any materials with possible archeological, historical, paleontological, or other cultural value, announce findings to project manager and notify relevant authorities;
ii. Protect artifacts as well as possible using plastic covers, and implement measures to stabilize the area, if necessary, to properly protect artifacts
iii. Prevent and penalize any unauthorized access to the artifacts
iv. Restart construction works only upon the authorization of the relevant authorities.

All contracts should include a Chance Finds Procedure clause.

4.0 BASELINE INFORMATION

4.1 Introduction

Baseline conditions entail the biophysical and abiophysical conditions of the project area. Baseline data is gathered to meet the following objectives:

i. To *understand* key social, cultural, economic, and political conditions in areas potentially affected by the proposed project;
ii. To *provide data* to predict, explain and substantiate possible impacts;
iii. To *understand* the expectations and concerns of a range of stakeholders (e.g., impacted settlements, authorities and NGOs) of the development of the Golf course, hotel and Spa, associated above ground installations and temporary facilities (particularly the construction camps);
iv. To *inform* the development of mitigation measures; and
v. To *benchmark* future socio-economic changes/ impacts and assess the effectiveness of mitigation measures.

The proposed Mzima II pipeline traverses Taita Taveta, Kwale and parts of Kilifi County. Thus, this section will touch on the baseline conditions in the three counties. However, Taita Taveta County will receive a special emphasis due to:

i. Mzima spring has its source in Tsavo National park found in Taita Taveta.
ii. Much of the pipeline traverses the county.
iii. There has been concerns that the county benefits least from the Mzima waters.

4.2 County Position, Size and Physiographic Conditions

Taita Taveta County is one of the six counties in the Coastal region of Kenya. It is located approximately 150 Km northwest of the coastal city of Mombasa and 350 Km southeast of Nairobi, the capital city of Kenya. It borders Tana River, Kitui and Makueni Counties to the North, Kwale and Kilifi Counties to the East, Kajiado County to the North-west, and the Republic of Tanzania to the South and South-west. The County covers an area of 17,084.1 Km2 and lies between latitude 20 46/ South and 40 10/ South and longitude 370 36/ East and 300 14/ East.

The County is divided into three major topographical zones. These area:

i. The upper zone, suitable for horticultural farming, comprises of Taita, Mwambirwa and Sagalla hills regions with altitudes ranging between 304 metres and 2,208 metres above sea level.
ii. The lower zone consists of plains where there is ranching, national parks and mining.

iii. The third topographical zone is the volcanic foothills zone which covers the Taveta region with potential for underground water and springs emanating from Mt. Kilimanjaro.

The main rivers in the County are the Tsavo, Lumi and Voi rivers. Mzima springs is the major water supplier to Voi town and Mombasa City, while small springs and streams include Njukini, Njoro kubwa, Kitobo, Sanite, Maji Wadeni, Humas Springs and Lemonya Springs.

In addition, there are two lakes, Jipe and Challa, both found in Taveta area. Lake Challa is a crater lake with little economic exploitation, while Lake Jipe is slightly exploited through small scale fishing. Both lakes are served by springs emanating from Mt. Kilimanjaro. The County is mainly dry, except for the Taita hills which are considerably wet. The effect of the South-Easterly winds influences the climate of the County. The hilly areas have ideal conditions for condensation of moisture, which result in relief rainfall.

4.3 Administrative and Political Units

Taita Taveta County is divided into various administrative and political units for management of the County and service delivery to the public. Politically, the County has four constituencies namely, Wundanyi, Mwatate, Voi and Taveta. These are further divided into 20 electoral wards (County assembly areas). With regard to administrative subdivisions, the County is composed of four sub-County units which follow the same boundaries as the constituencies and hence go by the same names as those of the constituencies. The County is further divided into 32 and 90 locations and sub-locations respectively. These are shown in the Table below.

Table 4: Political and administrative units of Taita Taveta County

Constituency	No. of Wards	Approx. Area in Km²	Name of Electoral Ward	Approx. Area in Km²	No. of Sub-locations
Taveta	5	626.2	Challa	207.4	5
			Mahoo	51.4	6
			Bomani	9.5	2
			Mboghoni	169.2	5
			Mata	188.7	5
	Tsavo West National Park[1]	6,543.8	-	6,543.8	-
Wundanyi	4	701.3	Wundanyi/ Mbale	44.1	8
			Werugha	27.2	4
			Wumingu/ Kishushe	525.1	6
			Mwanda/ Mgange	104.8	6
Mwatate	5	1837.6	Ronge	132.4	7
			Mwatate	343.0	3
			Bura	870.5	8
			Chawia	396.5	4
			Wusi/Kishamba	39.5	5
Voi	6	3,269.1	Mbololo	205.5	3
			Ngolia	84.6	3
			Sagalla	424.8	4
			Kaloleni	77.9	1
			Marungu	822.6	2
			Kasigau	1653.7	3
	Tsavo East National Park[2]	4,106.1	-	4,106.1	-
TOTAL	**20**	**17,084.1**	**20**	**17,084.1**	**90**

The proposed Mzima II water pipeline will supply water to Voi, Mwatate and Wundanyi. This will meet the water demand in these areas. In addition, it will bring to a closure the long standing political issue of the Mzima spring waters. Over the years, there has been a perception that Taita Taveta does not benefit from the water despite the fact that it is the source.

4.4 Demographic Characteristics

As of 2009, the population of the County was 284,657 (KNBS, 2009) where females and males were 139,323 and 145,334 respectively. The County population was projected to be 306,205 in 2012 comprising of 149, 869 females and 156,336 males. Further projections indicate that the total County population will increase to 329,383 and 345,800 in 2015 and 2017 respectively. Table 2 below gives the County population projections based on age cohorts (KNBS, 2009).

Table 5: Population distribution by age and gender in Taita Taveta

Age group	2009 (Census)			2012 (Projections)			2015 (Projections)			2017 (Projections)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-4	19,134	18,646	37,780	20,582	20,057	40,640	22,140	21,576	43,716	23,244	22,651	45,895
5-9	18,046	17,721	35,767	19,412	19,062	38,474	20,881	20,505	41,387	21,922	21,527	43,450
10-14	16,895	16,767	33,662	18,174	18,036	36,210	19,549	19,401	38,951	20,524	20,368	40,892
15-19	15,490	14,330	29,820	16,662	15,415	32,077	17,924	16,581	34,505	18,817	17,408	36,225
20-24	12,850	12,519	25,369	13,823	13,467	27,289	14,869	14,486	29,355	15,610	15,208	30,818
25-29	12,140	10,886	23,026	13,059	11,710	24,769	14,047	12,596	26,644	14,748	13,224	27,972
30-34	10,723	9,018	19,741	11,535	9,701	21,235	12,408	10,435	22,843	13,026	10,955	23,981
35-39	9,051	8,010	17,061	9,736	8,616	18,352	1,0473	9,268	19,742	10,995	9,730	20,726
40-44	6,853	6,104	12,957	7,372	6,566	13,938	7,930	7,063	14,993	8,325	7,415	15,740
45-49	5,997	5,766	11,763	6,451	6,202	12,653	6,939	6,672	13,611	7,285	7,005	14,290
50-54	4,588	4,658	9,246	4,935	5,011	9,946	5,309	5,390	10,699	5,573	5,659	11,232
55-59	3,947	3,715	7,662	4,246	3,996	8,242	4,567	4,299	8,866	4,795	4,513	9,308
60-64	2,995	3,288	6,283	3,222	3,537	6,759	3,466	3,805	7,270	3,638	3,994	7,633
65-69	2,180	2,360	4,540	2,345	2,539	4,884	2,523	2,731	5,253	2,648	2,867	5,515
70-74	1,754	1,962	3,716	1,887	2,111	3,997	2,030	2,270	4,300	2,131	2,383	4,514
75-79	1,093	1,387	2,480	1,176	1,492	2,668	1,265	1,605	2,870	1,328	1,685	3,013
80+	1,514	2,129	3,643	1,629	2,290	3,919	1,752	2,463	4,215	1,839	2,586	4,425
Age NS[3]	84	57	141	90	61	151	97	66	163	102	69	171
Total	**145,334**	**139,323**	**284,657**	**156,336**	**149,869**	**306,205**	**168,169**	**161,212**	**329,383**	**176,550**	**169,247**	**345,800**

For the whole population, the human sex ratio (ratio of males to females) is 1.04, meaning that for every 100 females, there are 104 males. For the population below 15 years, the ratio is 1.02, which is the same as at birth (KNBS, 2009). For the population between 15 and 64 years the ratio increases to 1.08 while in the case of 30 years and above, the ratio is 1.05. The ratio gets smaller as the population advances in age. For those of 40 years and above, the ratio is 0.99. This indicates that adult males tend to have higher death rate than adult females.

The intercensal growth rate for the County population is 1.6%. Whereas this is below the national average, estimated at 3%, (KNBS, 2009) the County population is nevertheless projected to increase to close to 346,000 people in 2017. The increase is expected to directly impact on the basic needs such as food, water and housing; social services such as health and education; and infrastructure including access roads and markets.

In addition, there are some age groups that need targeted interventions because of their special characteristics and needs. This includes: under one year, under five years, 3 to 5 years, primary

school going age, secondary school going age, youth population, female reproductive age, the labour force and the aged population.

The Gender Inequality Index (GII) reflects gender-based disadvantage in three dimensions — reproductive health, empowerment and the labour market. The index shows the loss in potential human development due to inequality between female and male achievements in these dimensions. It varies between 0 – when women and men fare equally – and 1, where one gender fares as poorly as possible in all measured dimensions. Improving equity in gender issues and reducing gender disparities will benefit all sectors and thus contribute to sustainable economic growth, poverty reduction and social injustices

The proposed Mzima II project will supply and meet the water demand by the population. Thus issues touching on the Human Development Index (HDI), Gender Inequality Index (GII) will be addressed.

4.5 Infrastructure and access

Taita Taveta County has approximately 90 class D, E and unclassified roads totaling 1,513 km and a further 200 km of class A, B and C roads. The main roads are A109 -Bachuma to Mtito Andei (150 Km), A23 Voi to Taveta (123Km), C104 Mwatate to Wundanyi (18Km) and C105 Voi loop (6Km). The roads in Voi Town have a total length of about 50km.

Of the total County road network, 199 Km is bitumen, 138.2 Km is gravel, and 1251.8 Km is earth. The Mwatate-Taveta road that holds the key to the County's economic potential has so far not been tarmacked. Most of the bitumen is however along the Nairobi–Mombasa highway. The road networks within the County are not well developed and maintained. Roads especially in the highlands of Wundanyi, Mwambirwa and Sagalla areas become impassable during the rainy periods.

There are three railway lines which traverse the County, the new Standard Gauge Railway (SGR), the old Nairobi-Mombasa railway line and the Voi-Taveta line which has stations at Mwatate, Bura Mwakitau and Taveta. The latter, which is 96 Km in length, is however currently not in operation.

There are 17 airstrips in the County with 6 located in Taveta, 5 in Voi and 6 in Mwatate. These include two private airstrips, one located in Mwatate and the other in Taveta and 4 airstrips located in the Tsavo National Park.

4.6 Education institutions

There are 425 Early Childhood Development Education (ECDE) centres in the County of which 385 are public and 40 are private. Whereas the government's intention in the Sessional Paper No. 1 of 2005 was to have integrated ECDE into basic education, implementation of the policy has been weak. Hence most ECDE development has come from private initiatives.

However, there are a number of public primary schools in the County that have integrated a pre-primary unit in their system to cater for developmental and educational needs of the children within ages 0-3 and 4-5 years. Some local communities have also identified social or church halls for use as ECDE centres.

In the case of primary education, there are 261 primary schools where 221 are public while the remaining 40 are either private- or mission-owned.The primary school age group has an estimated population of 56,988. Already there is a strain on existing facilities, with some public primary schools sharing some facilities with their respective pre-primary units. With the population projected to grow steadily over the next few years to about 61,300 in year 2017, the County must set aside adequate resources to expand school infrastructure to meet present and future demand.

The County has 85 public secondary schools which are either day or boarding. Two public secondary schools have been elevated to a national school status. These are Kenyatta High School and Bura Girls Secondary School, both in Mwatate constituency.

The 85 secondary schools in Taita Taveta are not adequate to meet the demand for secondary education. This partly explains the reason for the low primary to secondary school transition rate, which stands at 67.5% (2010). The main reason most don't transit is because they cannot get space in the few schools available, especially for those who do not perform well and come from poor families and cannot afford far flung boarding facilities.

With respect to post-secondary education, the County has one public University, the Taita Taveta University, one public institute, the Coast Institute of Technology, and one mission Teachers' Training College. In addition, there are four tertiary colleges which are privately owned.

4.7 Land and Land Use

The total land area in Taita Taveta County is 17,059.1 Km^2. Of this, total agricultural land is approximately 10,630 Km^2, with arable land constituting about 2,055 Km^2. The rest is range land,

suitable for livestock rearing. Approximately 14,307.2 Km2 of land is non-arable. The percentage of arable and non-arable land area is 12% and 88% respectively.

Additionally, the two National Parks cover an approximate area of 10,650 Km2, which translates to about 62% of the total land area. Water bodies cover approximately 16 Km2, leaving about 22% of County land for settlement and agricultural activities.

Land available for household farming activities is reduced drastically due to the presence of a total of 28 ranches which combined, cover an approximate area of 773.5 KM^2. Eight of these belong to the Kenya Government, nine to group ranches and 11 are privately owned. The average size of the ranches is 2,762.5 Ha.

Large scale sisal farming for fibre production further reduces land available for settlement and household farming activities. There are three companies that produce sisal for both domestic and export markets. Rain fed agriculture is the dominant activity by most households as a subsistence and/or economic undertaking.

The average farm holding in the areas that have agricultural potential ranges between 0.5 ha to 30ha, while that of rain fed ranges between 2ha - 20ha. The average farm size for small scale farmers is about 0.4 Ha in the highlands, 1.3 Ha in the midlands, and 4.8 Ha in the lowlands. In the case of large scale farming (mostly sisal estates), the average farm size is 7,400 Ha. The total acreage under food crops is 18,125 Ha while the total acreage under horticulture (excluding sisal estates) is 3,296 Ha. The land in the County is communally owned with approximately 35% having title deeds. Land adjudication is currently going on to ensure all land owners are issued with title deeds.

Livestock keeping is a major land use practice in the county. The main types of livestock kept in being beef cattle, dairy cows, sheep, goats, camels, pigs and poultry. Chicken is the main poultry reared, although guinea fowl rearing is emerging in some parts of the County. Rabbit keeping is also a livestock enterprise that is undertaken in the County.

The livestock population in the County is currently estimated at 179,864 cattle, 480125 goats, 55,540 sheep, 671,174 poultry, 3,568 donkeys and 1,286 camels. In addition, there are an estimated 11,802 beehives. The annual revenue generated from livestock production is estimated at over 950 million.

The proposed project will be a boost to livestock keeping due to a constant water supply

4.8 Tourism

The County has immense potential to reap economic gains from tourism activities. There exists a wide range of tourist attractions in Taita Taveta. The county prides itself in being home to Tsavo East and Tsavo West National Parks, one of the main tourist attractions in the country. In addition to their magnificent scenery, the parks team with wildlife and birdlife, and are also home to indigenous forests with rare tree species. The northern part of Tsavo West has a rolling volcanic landscape carpeted in long grass and dense bush. In Tsavo West in particular, the main attractions include volcanoes, lava flows, caves, and Mzima Springs. Tourist activities in the park comprise game viewing, camping, cave exploration, and underwater hippo and fish watching. Tsavo East, christened "Theatre of the Wild," offers a vast and untapped arena of arid bush which is washed by azure and emerald meandering of Galana River. It is guarded by the limitless lava reaches of Yatta plateau and patrolled by some of the largest elephant herds in Kenya.

Other attractions include: Aruba dam that is visited by thousands of animals; Mudanda rock that towers above a natural dam; Lugards Falls, which feature bizarrely eroded rocks through which the waters of the Galana River plunge into foaming rapids and crocodile infested pools; and the heat shimmering end of Yatta Plateau, the longest lava flow in the world at 300 kilometers in length, an ornithological paradise that attracts migrating birds from all over the world. These include goshawks, buffalo weaver and palm nut vultures, African skimmers. Other birds are weaverbirds, sunbirds, kingfisher and hornbills.

The County is dotted by the spectacular Taita Hills comprising of Sagalla, Kasigau and Dabida massifs. The latter is the largest and tallest of the three, with an altitude of 2,208 meters above sea level at Vuria, which is its peak. This is also the highest point in the coast region. Other three main peaks are at Dawida massif are Iyale, Wesu, and Susu.

On top of forming perfect spots for rock climbing and campsites, the hills are known for their moist forests with a unique biodiversity (fauna and flora). More than 20 endemic species of African violets (e.g. *Saintpaulia teitensis*) occur exclusively here. Also, the Taita Thrush and the Taita Apalis are endemic bird species found here. The Taita Falcon and the Taita Fiscal were first discovered at the hills but occur elsewhere too.

Tourist facilities in the county will benefit from the proposed project. They have been supplementing their supply with water from boreholes which is expensive in terms of treatment and also laundry due to large volumes of detergents used.

4.9 Water and Sanitation

The County has a total of 71,090 households, of which 35% (24,882) have access to piped water. 41,390 households, representing 58% of the total households have access to portable water. The number of households with roof catchment systems stands at 13,400 representing 19% of the total number of households. With scarcity of rainfall, efforts should be made to increase the number of households with roof catchments to tap rain water. The water quality (% of cleanliness) is 80%. In terms of water resources, there are six main rivers, 95 shallow wells, 92 protected springs, 25 water pans, five dams, 25 boreholes and 57 Water supply schemes in the County.

The County has the biggest water supply scheme in the coastal region. This is the Mzima Water Project, which supplies water to Voi town and its environs through a number of major projects including Voi water supply, Mbololo water supply, Irima, Kimwa and Kaloleni water projects, Miasenyi water project, Manyani water supply, and Maungu-Buguta water project. This scheme is also among the major suppliers of water in the coastal city of Mombasa. The source of the water is Mzima springs, which is situated in the Tsavo West National Park.

Other major water schemes are found in Taveta and Wundanyi areas. In Taveta, there are four schemes. These are Taveta Lumi water supply, Challa water project, Chumvuni water project, and Kitobo water project. The County is home to both surface and underground water sources. The surface water sources include Mzima springs, Lakes Challa and Jipe, and some rivers like Mwatate, Kishenyi, Ziwani, Lumi, Sanga, Wanganga and Voi, Challa, Kigombo and Kishushe. Underground water resources include two springs, Homer's and Lemonya, and a number of streams including Njukini, Sanite Njoro Kubwa, Kitobo, and Maji ya waleni.

The average distance to the nearest water point is 1.25 Km. In the County, an estimated 13% of households take between 1-4 minutes one way to fetch drinking water. Likewise, 27.2% take between 5-14 minutes and 35% take between 15-29 minutes. About 24.8% of households take 30 minutes and above one way to fetch water.

The majority of households in the County use pit latrines, which are 75.8% of total number of toilet facilities. 67.4% of these are covered pit latrines. The Ventilated Improved Pit (VIP) latrines form 4.5% of total toilet facilities. The other main type of facility is Flush toilets, which accounts

for 5.8%. An estimated 63,981 (about 86%) of the total households in the County have access to toilet facilities while about 14% of households do not have any kind of toilet facility.

The farm/garden accounts for the largest garbage/waste disposal type at 44.1%, followed by garbage pits at 23.7%, burning at 22.1%, public garbage heaps at 6.4%, collection by county government at 2.4%, and collection by private firms at 0.3%. The county government is playing its role in solid wastes management to make the environment more habitable.

With the proposed allocation of 25,800M³ /day from the proposed Mzima II project, households in the county will be self-sufficient in water. This will in turn improve the sanitation situation.

4.10 Biodiversity

The proposed project will abstract 105,000 M³/day from the Mzima springs in Tsavo West national park where Mzima I starts and terminate at Mazeras. The new pipeline Mzima II will follow the route used by the Mzima I pipeline (Figure1). A significant proportion part of the project will be in the Tsavo West and Tsavo East National Parks and therefore most of potential impacts on biodiversity will be experienced in the parks. As such our review of the biodiversity status of the project area will mainly focus on the Tsavo ecosystem but some of the impacts identified might also apply in the project area outside the parks which is also rich in biodiversity.

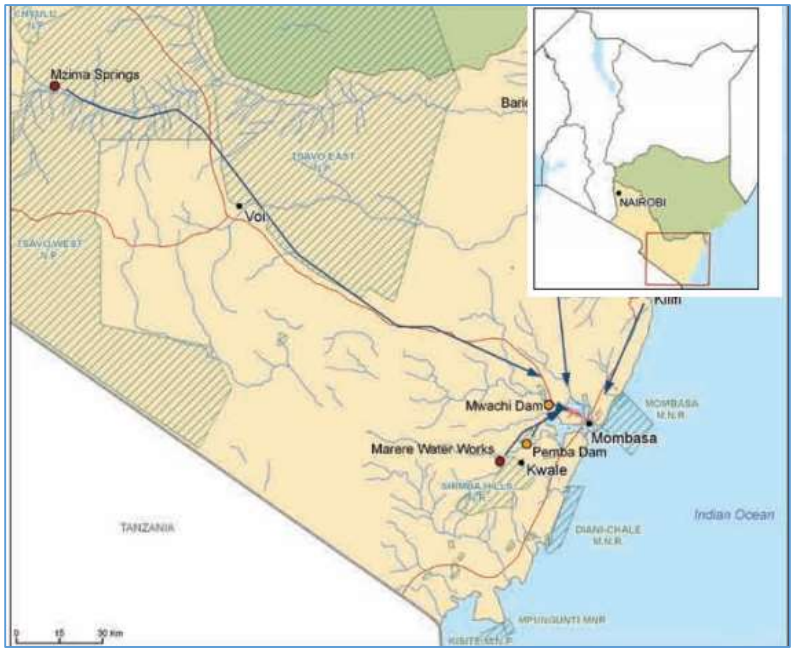

Figure 3: Water Pipelines serving Mombasa (WRI, 2007)

4.10.1 Biodiversity status of the Tsavo national Parks

Tsavo National Park was originally established in 1948. In 1949 it was separated into Tsavo West and Tsavo East (Figure 1) for administrative purposes. Tsavo East covers 11,741 Km2 and is dominated by open grassland, with scattered rocky outcrops. Along the rivers occurs riverine forest and thicket, dominated by *Acacia elatior*, the Doum Palm *Hyphaene compressa* and the shrub *Suaeda monoica*. Common shrubs here include species of *Premna, Bauhinia* and *Sericocomopsis . Other trees found in the park are the* Baobab (*Adansonia digitata*) *Delonix elata* and *Melia volkensii*.

Tsavo West National Park is wooded savanna stretching from the Athi River, north of the Mombasa-Nairobi road, south to the Tanzanian border. The north-eastern boundary along the Athi adjoins Tsavo East National Park. Tsavo West is located within Taita Taveta district, and borders with Makueni and Kajiado districts. It covers an area of about 9,065 square kilometers. Mzima Springs – the water source for this project is located within Tsavo West national Park and is one of the Key tourist attractions due to its scenic appeal and rich biodiversity. The spring creates a green oasis, which provides a strikingly beautiful contrast to the surrounding semi-arid land. The springs are home to hippos, crocodile, fish birds, vervet monkeys and other biodiversity. The Endangered Voi Cycad (*Encephalartos kisambo*) has been recorded from southern Kenya on the slopes of Maungu (Marungu) Hills near Voi. Other plant species of concern interesting including globally threatened and invasive plants are presented in Table 1

Table 6: Key plant species in Tsavo

Species		**Conservation status**	
Common name	**Scientific Name**	**IUCN**	**National cons status/Notes**
African blackwood	*Dalbergia melanoxylon*	NT	
African star-chestnut	*Sterculia Africana*	NT	
Voi Cycad (	*Encephalartos kisambo*	EN	
Chocolate berry	*Vitex payos*	DD	
Sweet prickly pear	*Opuntia ficus*	DD	Invasive spp
Erect prickly pear	*Opuntia stricta*	LC	Invasive spp
Morning Glory	*Ipomoea spp.*	LC	Invasive spp
Red Hot Poker trees	*Euphorbia kibwezensis*		Rare
Red-leaved fig	*Ficus ingens*		Rare
Creamy Peacock Flower	*Delonix elata*	LC	
Rat aloe	*Aloe ballyi*	VU	VU

In the Table, LC = Least Concern; VU = Vulnerable; DD = data deficient; NT = Near threatened.

4.10.2 **Mammal diversity**

Some of the mammals that are found in the two parks are listed in Table 4. Both Parks holds substantial proportion of Kenyan populations of Black rhinos (*Diceros bicornis*) mainly within the Ngulia Rhino Sanctuary in Tsavo West but also free ranging in Tsavo East. as. The global population of Black Rhino has declined drastically over last 30 years and are now classified as Critically Endangered by IUC. The rhino populations in Tsavo ecosystem remain small, isolated and vulnerable.

Plate 1: Black Rhino in Tsavo West

Source: https://www.awf.org/projects/ngulia-rhino-sanctuary

Plate 2: An Elephant ©Paul Muoria

The Tsavo ecosystem holds the largest African Elephant (*Loxodonta Africana*) population in Kenya. Elephants as classified as Vulnerable by IUCN and Endangered by Wildlife Act 2013 (GOK, 2013). In a survey conducted in 2017, a total of 12573 elephants were counted in the ecosystem that includes the two parks and surrounding areas including Chyulu Hills National Park, Kitui National Reserve, Mkomazi National Reserve, and several private and community ranches.

Other globally and/or nationally threatened mammals found in both Tsavo East and West National Parks include the critically endangered Hirola (*Damaliscus hunteri*), the endangered Grevy's Zebra(*Equus Grevyi*) and large carnivores. Grevy's zebra are endemic to northern Kenya and southern and eastern Ethiopia; but were introduced into the Tsavo ecoystem in the late 1960s and 1970s. Their current population in the area is not ecologically viable. Hirola is one of the world's rarest antelopes. It was introduced into the Tsavo ecosystem and its current population around 100. Most of the large carnivores found in the ecosystem including cheetah (), wilddogs (), lions(), Leopard (*Panthera pardus*) and the stripped hyena (*Hyena hyena*), are highly threatened, yet play an ecologically (and economically from a tourism perspective) essential role in the Tsavo ecosystem. Wild dogs are classified as Endangered by IUCN. Wild carnivores in the ecosystem and other parts of Kenya are facing increased threats including human-wildlife conflict, poaching and closure of dispersal areas.

Plate 3: Grevy's Zebra © Paul Muoria

Plate 4: Lions© Paul Muoria

Table 7: Mammals in Tsavo ecosystem

Species		**Conservation status**	
Common name	**Scientific Name**	**IUCN**	**National**
Aardwolf	*Proteles cristata*	LC	
African civet	*Civettictis civetta*		
African golden cat	*Profelis aurata*	VU	VU
African hare	*Lepus microtis*		
African hunting dog	*Lycaon pictus*	EN	EN
African wildcat	*Felis lybica*		
Banded mongoose	*Mungos mungo*		
Bat-eared fox	*Otocyon megalotis*		
Black faced vervet monkey	*Chlorocebus pygerythrus*		
Black rhinoceros	*Diceros bicornis michaeli*	CR	CR
Black-backed jackal	*Canis mesomelas*		
Blue duiker	*Philantomba monticola*		
Bohor reedbuck	*Redunca redunca*		
Bush duiker	*Sylvicapra grimmia*		
Bush squirrel	*Paraxerus ochraceus*		
Bushbuck	*Tragelaphus sylvaticus*		
Cane rat	*Thryonomys swinderianus*		
Cape buffalo	*Syncerus caffer*	LC	
Caracal	*Caracal caracal*		
Cheetah	*Acinonyx jubatus jubatus*	VU	EN
Clawless otter	*Aonyx capensis*	NT	
Coke's hartebeest	*Alcelaphus buselaphus cokii*		
Common zebra	*Equus Zebra*		
Crested porcupine	*Hystrix cristata*		
Dik-dik	*Madoqua kirkii*		
Dwarf mongoose	*Helogale parvula*		
East African hedgehog	*Atelerix albiventris*		
East African red squirrel	*Paraxerus palliates*		VU
Egyptian mongoose	*Herpestes ichneumon*		
Eland	*Taurotragus oryx*		
Elephant	*Loxodonta Africana*	VU	EN
Fringe-eared oryx	*Oryx beisa callotis*		
Gerenuk	*Litocranius walleri*	NT	
Giant rat	*Cricetomys gambianus*		

Species		**Conservation status**	
Grants Gazelle	*Nanger granti*		
Greater galago	*Otolemur crassicaudatus*		
Grevy's zebra.	*Equus grevyi*	EN	EN
Ground pangolin	*Smutsia temminckii*	VU	
Hunter hartebeest	*Beatragus hunter*	CR	
Impala	*Aepyceros melampus*		
Klipspringer	*Oreotragus oreotragus*		
Large-spotted genet	*Genetta tigrina*		
Leopard	*Panthera pardus*	NT	EN
Lesser Bushbaby	*Galago senegalensis*	LC	
Lesser kudu	*Tragelaphus imberbis*	NT	VU
Lion	*Panthera leo*	VU	EN
Marsh mongoose	*Atilax paludinosus*		
Masai Giraffe	*Giraffa tippelskirchi*	VU	
Naked mole rat	*Heterocephalus glaber*		
Ratel	*Mellivora capensis*		
Red duiker	*Cephalophus natalensis*		
Rock hyrax	*Heterohyrax brucei*		
Serval	*Leptailurus serval*		
Side-striped jackal	*Canis adustus*		
Slender mongoose	*Galerella sanguinea*		
Small-spotted genet	*Genetta genetta*		
Spectacled elephant shrew	*Elephantulus brachyrhynchus*		
Spotted hyena	*Crocuta crocuta*	LC	VU
Springhare	*Pedetes capensis*		
Striped ground squirrel	*Xerus erythropus*		
Striped hyena	*Hyaena hyaena*	NT	EN
Suni	*Neotragus moschatus*		
Sykes' monkey	*Cercopithecus albogularis*		
Tree hyrax	*Dendrohyrax validus*		VU
Unstriped ground squirrel	*Xerus rutilus*		
Warthog	*Phacochoerus africanus*		
Waterbuck	*Kobus ellipsiprymnus*		
White-tailed mongoose	*Ichneumia albicauda*		
Yallow baboons	*Papio cynocephalus*		
Yellow baboon	*Papio cynocephalus*	LC	

In the Table, CR = critically threatened; LC = Least Concern; VU = Vulnerable; DD = data deficient; NT = Near threatened.

4.10.4 Bird species diversity

At least 600 and 500 bird species have been recorded in Tsavo West NP and Tsavo East, respectively. The Near Threatened *Mirafra pulpa* occurs in both parks. Tsavo ecosystem is also an important part of a corridor of natural habitat in eastern Kenya through which vast numbers of Palearctic birds migrate, especially in November/December. These include the globally threatened *Crex crex* and Near Threatened *Acrocephalus griseldisand* ***Falco naumanni***. Other regionally threatened species common in Tsavo west are *Struthio camelus; Casmerodius albus ; Trigonoceps occipitalis ; Polemaetus bellicosus ; Coturnix adansonii ; Podica senegalensis; Phoeniculus granti ;* and *Buphagus africanus* **.** Regionally threatened species in Tsavo East National Park include *Anhinga rufa*; *Casmerodius albus ; Ephippiorhynchus senegalensis ; Trigonoceps occipitalis; Polemaetus bellicosus , Podica senegalensis*; and *Phoeniculus granti*. Birds that qualify bot Tsavo West and Tsavo East national parks as Important Bird Areas (IBAs) are listed in Table 5while birds that have been caught and ringed by Ngulia Ringing Group (Ngulia Ringing Group, Personal communication) are presented in Table 4.

Table 8: Globally threatened Birds and IBA trigger species found in Tsavo East and Tsavo West National Parks

Common name	Scientific name	Current IUCN Red List Category	National Status/Notes	Migrant?
Friedmann's Lark	*Mirafra pulpa*	DD	LC	Resident
Basra Reed-warbler	*Acrocephalus griseldis*	EN	EN	Resident
Crex crex	*corncrake*	LC	NT	Resident
Abyssinian Scimitarbill	*Rhinopomastus minor*	LC		Resident
African Grey Flycatcher	*Bradornis microrhynchus*	LC		Resident
Ashy Cisticola	*Cisticola cinereolus*	LC		Resident
Banded Warbler	*Sylvia boehmi*	LC		Resident
Bare-eyed Thrush	*Turdus tephronotus*	LC		
Comon Ostrich	*Struthio camelus*	LC	Protected species	Resident
Black-bellied Sunbird	*Cinnyris nectarinioides*	LC		
Black-capped Social-weaver	*Pseudonigrita cabanisi*	LC		
Black-cheeked Waxbill	*Estrilda charmosyna*	LC		
African Darter	*Anhinga rufa*	LC	Protected Species	Resident

Common name	Scientific name	Current IUCN Red List Category	National Status/Notes	Migrant?
Black-faced Sandgrouse	*Pterocles decoratus*	LC		
Black-throated Barbet	*Tricholaema melanocephala*	LC		
Great egret	*Casmerodius albus*	LC	Protected species	C
Blue-capped Cordon-bleu	*Uraeginthus cyanocephalus*	LC		
Chestnut-headed Sparrow-lark	*Eremopterix signatus*	LC		
Donaldson-Smith's Nightjar	*Corncrake Crex crex*	LC		
Donaldson Smith's Nightjar	*Caprimulgus donaldsoni*	LC		
Eastern Chanting-goshawk	*Melierax poliopterus*	LC		
Eastern Yellow-billed	*Hornbill Tockus flavirostris*	LC		
Fire-fronted Bishop	*Euplectes diadematus*	LC		
Fischer's Starling	*Lamprotornis fischeri*	LC		
Golden Pipit	*Tmetothylacus tenellus*	LC		
Golden-breasted Starling	*Lamprotornis regius*	LC		
Grey Wren-warbler	*Calamonastes simplex*	LC		
Grey Wren-warbler	*Calamonastes simplex*	LC		
Grey-headed Silverbill	*Odontospiza griseicapilla*	LC		
Heuglin's Bustard	*Neotis heuglinii*	LC		
Hildebrandt's Starling	*Lamprotornis hildebrandti*	LC		
Hunter's Sunbird	*Chalcomitra hunteri*	LC		
Lesser Kestrel	*Falco naumanni*	LC	VU	Paleatic migrant
Long-tailed Fiscal	*Lanius cabanisi*	LC		
Magpie Starling	*Speculipastor bicolor*	LC		
Mouse-coloured Penduline-tit	*Anthoscopus musculus*	LC		
Pale Prinia	*Prinia somalica*	LC		
Pangani Longclaw	*Macronyx aurantiigula*	LC		
Pink-breasted Lark	*Calendulauda poecilosterna*	LC		
Red-and-yellow Barbet	*Trachyphonus erythrocephalus*	LC		
Red-bellied Parrot	*Poicephalus rufiventris*	LC		
Red-naped Bush-shrike	*Laniarius ruficeps*	LC		
Red-winged Lark	*Mirafra hypermetra*	LC		

Common name	Scientific name	Current IUCN Red List Category	National Status/Notes	Migrant?
Rosy-patched Bush-shrike	*Rhodophoneus cruentus*	LC		
Rufous Chatterer	*Argya rubiginosa*	LC		
Scaly Chatterer	*Argya aylmeri*	LC		
Shelley's Starling	*Lamprotornis shelleyi*	LC		
Somali Bee-eater	*Merops revoilii*	LC		
Somali Bunting	*Emberiza poliopleura*	LC		
Somali Crombec	*Sylvietta isabellina*	LC		
Somali Tit	*Melaniparus thruppi*	LC		
Sombre Nightjar	*Caprimulgus fraenatus*	LC		
Southern Grosbeak-canary	*Crithagra buchanani*	LC		
Steel-blue Whydah	*Vidua hypocherina*	LC		
Straw-tailed Whydah	*Vidua fischeri*	LC		
Taita Fiscal	*Lanius dorsalis*	LC	Protected	Resident
Taveta Golden Weaver	*Ploceus castaneiceps*	LC	Protected	Resident
Three-streaked Tchagra	*Tchagra jamesi*	LC		
Tsavo sunbird	*Cinnyris tsavoensis*	LC	Protected	Resident
Tiny Cisticola	*Cisticola nana*	LC		
Von der Decken's Hornbill	*Tockus deckeni*	LC		
Vulturine Guineafowl	*Acryllium vulturinum*	LC		
White-bellied Canary	*Crithagra dorsostriata*	LC		
White-bellied Go-away-bird	*Criniferoides leucogaster*	LC		
White-headed Buffalo-weaver	*Dinemellia dinemelli*	LC		
White-headed Mousebird	*Colius leucocephalus*	LC		
Yellow-necked Francolin	*Pternistis leucoscepus*	LC		
Yellow-vented Eremomela	*Eremomela flavicrissalis*	LC		
Common Ostrich	*Struthio camelus*	LC	Protected	Resident
D'Arnaud's barbet	*Trachyphonus darnaudii*	NR	LC	SV
Abyssinian white-eye	*Zosterops abyssinicus*	NR		Resident
Secretary Bird	*Sagittarius serpentarius*	VU	Protected	Resident

In the Table, LC = Least Concern; VU = Vulnerable; DD = data deficient; NT = Near threatened.

Table 9: Birds observed/ringed at Ngulia

Common name	Scientific Name	IUCN Conservation status
Zanzibar Greenbul	*Andropadus importunus*	LC
Black-headed apalis	*Apalis melanocephala*	LC
Little Swift	*Apus affinis*	LC
Donaldson Smith's Nightjar	*Caprimulgus donaldsoni*	LC
Grey-backed Camaroptera	*Camaroptera brachyura*	LC
Nubian Woodpecker	*Campethera nubica*	LC
Gabon Nightjar	*Caprimulgus fossii*	LC
Dusky Nightjar	*Caprimulgus fraenatus*	LC
Plain Nightjar	*Caprimulgus inornatus*	LC
Nubian Nightjar	*Caprimulgus nubicus*	LC
Lesser Striped Swallow	*Cecropis abyssinica*	LC
Pygmy Kingfisher	*Ceyx pictus*	LC
Amethyst Sunbird	*Chalcomitra amethystina*	LC
Diederik Cuckoo	*Chrysococcyx caprius*	LC
Black-bellied Sunbird	*Cinnyris nectarinioides*	LC
Variable Sunbird	*Cinnyris venustus*	LC
Rattling Cisticola	*Cisticola chiniana*	LC
Jacobin Cuckoo	*Clamator jacobinus*	LC
Red-capped Robin Chat	*Cossypha natalensis*	LC
Harlequin Quail	*Coturnix delegorguei*	LC
Wattled Starling	*Creatophora cinerea*	LC
Northern Puffback	*D. gambensis*	LC
Cardinal Woodpecker	*Dendropicos fuscescens*	LC
Common Drongo	*Dicrurus adsimilis*	LC
Pringle's Puffback	*Dryoscopus pringlii*	LC
Somali Bunting	*Emberiza poliopleura*	LC
Cinnamon-breasted Bunting	*Emberiza tahapisi*	LC
Crimson-rumped Waxbill	*Estrilda rhodopyga*	LC
White-winged Widowbird	*Euplectes albonotatus*	LC
Northern White-crowned Shrike	*Eurocephalus rueppelli*	LC
Purple Grenadier	*Granatina ianthinogaster*	LC
Grey-headed Kingfisher	*Halcyon leucocephala*	LC
Lesser Striped Swallow	*Hirundo abyssinica*	LC
Lesser Honeyguide	*Indicator minor*	LC
Jameson's Firefinch	*Lagonosticta rhodopareia*	LC

Common name	Scientific Name	IUCN Conservation status
Red-billed Firefinch	*Lagonosticta senegala*	LC
Superb Starling	*Lamprotornis suberbus*	LC
Slate-coloured Boubou	*Laniaris funebris*	LC
Pangani Longclaw	*Macronyx aurantiigula*	LC
Gambaga Flycatcher	*Musicapa gambagae*	LC
Grey-headed Silverbill	*Odontospiza griseicapilla*	LC
Namaqua Dove	*Oena capensis*	LC
Red-winged Starling	*Onychognathus morio*	LC
Village Weaver	*P. cucullatus*	LC
Chestnut Weaver	*P. rubiginosus*	LC
Grey-headed Sparrow	*Passer griseus*	LC
Yellow-spotted Petronia	*Petronia pyrgita*	LC
Northern Brownbul	*Phyllostrephus strepitans*	LC
Village Weaver	*Ploceus cucullatus*	LC
Lesser Masked Weaver	*Ploceus intermedius*	LC
Chestnut Weaver	*Ploceus rubiginosus*	LC
Vitelline Masked Weaver	*Ploceus vitellinus*	LC
Common Bulbul	*Pycnonotus barbatus*	LC
Green-winged Pytilia	*Pytilia melba*	LC
Red-billed Quelea	*Quelea quelea*	LC
Red-eyed Dove	*Streptopelia semitorquata*	LC
Laughing Dove	*Streptopelia senegalensis*	LC
Red-faced Crombec	*Sylvietta whytii*	LC
Three-streaked Tchagra	*Tchagra jamesi*	LC
Black-crowned Tchagra	*Tchagra senegalus*	LC
African Paradise Flycatcher	*Terpsiphone viridis*	LC
D'Arnaud's Barbet	*Trachyphonus darnaudii*	LC
Spot-flanked Barbet	*Tricholaema lacrymosa*	LC
Common Buttonquail	*Turnix sylvatica*	LC
Emerald-spotted Wood Dove	*Turtur chalcospilos*	LC
Red-cheeked Cordon-bleu	*Uraeginthus bengalus*	LC
Mbulu White-eye	*Z. mbuluensis*	LC
Zanzibar Greenbul	*Andropadus importunus*	LC
Abyssinian White-eye	*Zosterops abyssinicus*	LC

4.10.5 Reptiles and amphibians of Tsavo ecosystem

The Tsavo ecosystem is rich in reptiles. This includes crocodiles (for example at Mzima springs), *Agma agma* lizard, African helmeted turtle, Tsavo Gecko and chameleon. Some of the snakes that have been recorded in the parks include the Puff adder (*Bitis arietans),* boomslang (Dispholidus typus), Large brown spitting cobra (*Naja ashei)' s*mall-scaled burrowing asp (*Atractaspis microlepidota),* red spitting cobra (*Naja pallida) and* black mamba (*Dendroaspis polylepis).* The Vulnerable pancake tortoise (*Malacochersus tornieri)* has also been recorded in Tsavo East National park (Malaoza, 2003). The Africa reed frog (*Hyperolius rhizophilus*) that is classified as Data Deficient by IUCN also occurs in this ecosystem.

Table 10: Herpetofauna and amphibians in Tsavo

Species		**Conservation status**	
Common name	**Scientific Name**	**IUCN**	**Nat con status/Notes**
African Helmeted Terrapin	*Pelomedusa subrufa*	LC	
African Rock Python	*Python sebae*	NE	
Baobab gecko	*Hemidactylus platycephalus*		Protected
Flap-neck Chameleon	*Chamaeleo dilepis*	LC	Protected Species
Goldie's tree cobra or Gold's tree cobra	*Pseudohaje goldii*	LC	
Kenya Pygmy-Chameleon	*Rieppeleon kersteni*	LC	
Nile Crocodile	*Crocodylus niloticus*	LC	
Pancake tortoise(Crevice tortoise)	*Malacochersus tornieri*	VU	NT
Puff Adder	*Bitis arietans*	NE	Protected Species
Red-headed agama lizard	*Agama agama*	LC	Invasive
Reed Frog	*Afrixalus pygmaeus septentrionalis*	LC	Endemic to Tsavo Area
Savannah monitor lizard	*Varanus albigularis*	LC	Protected Species
Scheffler's Dwarf Gecko	*Scheffler's Dwarf Gecko*	DD	
Sheldrick's reed frog	*Hyperolius sheldricki*	LC	Endemic to Tsavo Area
Slender/graceful Chameleon	*Chamaeleo gracilis*	LC	

4.10.6 Wildlife migration routes

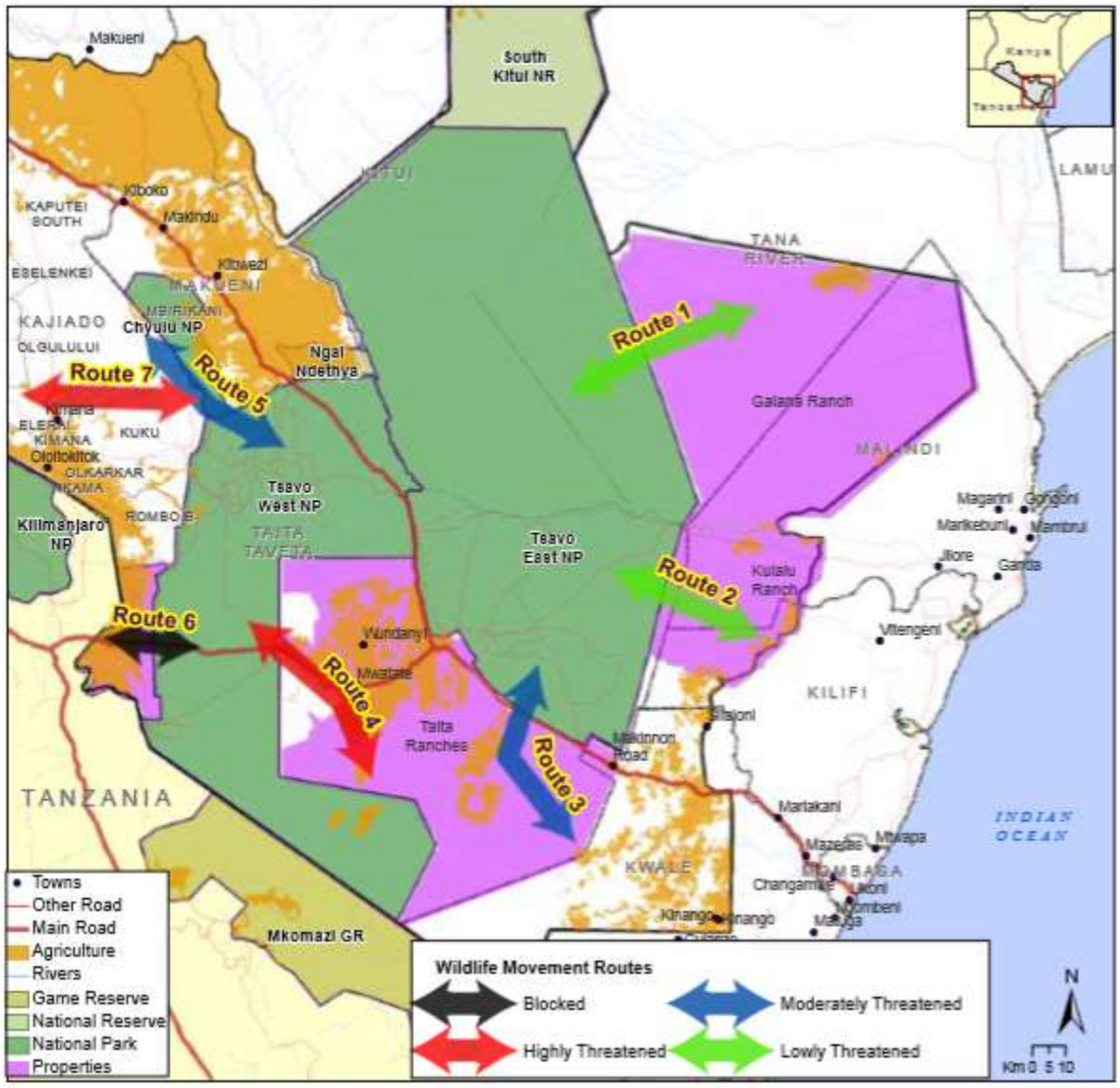

Figure 4: Wildlife migratory routes/corridors in the Tsavo-Mkomazi ecosystem (Ojwang, *et al*, 2017)

Project area, particularly in the Tsavo ecosystem, has high wild animal densities (Ojwang' *et al* , 2017). Towards the Southern Part of Tsavo East National Park the pipeline will cut across at least one documented elephant migration corridor that links the Tsavo elephant population to Kwale County. It is possible that there are other undocumented migration corridors. Care should be taken to avoid blocking the migration corridors by ensuring that no trenches are left uncovered and no structure including workers camps are set up in such areas. Due to higher possibilities of human elephant conflicts along migration routes, the workers will need to be accompanied by KWS rangers when working in these areas.

4.11 Chyulu Hills Surface and Ground Catchments

4.11 Chyulu Hills Surface and Groundwater Catchments

The Chyulu Hills are situated in south-eastern Kenya, are formed from volcanic cones that emanate from an elongated vent structure which runs in a north west – south east direction. The main ridge of hills form along a 40 km long series of volcanic cones, with the highest peak at approximately 2188masl. The hills are surrounded by plains of old lava flows, ash deposits and pyroclastic material from historic eruptions, which support soils of varying thicknesses and types depending on the makeup and degree of weathering of the volcanic materials.

The area is classified as semi-arid, although the hills themselves have an orographic impact on rainfall, with higher rainfall on the ridge and eastern slope, and a 'rain shadow' effect leading to lower rainfall to the west and south. Vegetation varies from grasslands with scattered trees on the plains and former ash fields through to thicket forest on some lava fields and montaine forest on the top of the ridge.

The key attribute of interest of the Chyulu hills is the large groundwater catchment that is formed by the hills and surrounding volcanic material. As shown in Figure below, this forms a relatively high recharge aquifer with a surface area of approximately 2,126 km2, much of which drains into the Mzima springs.

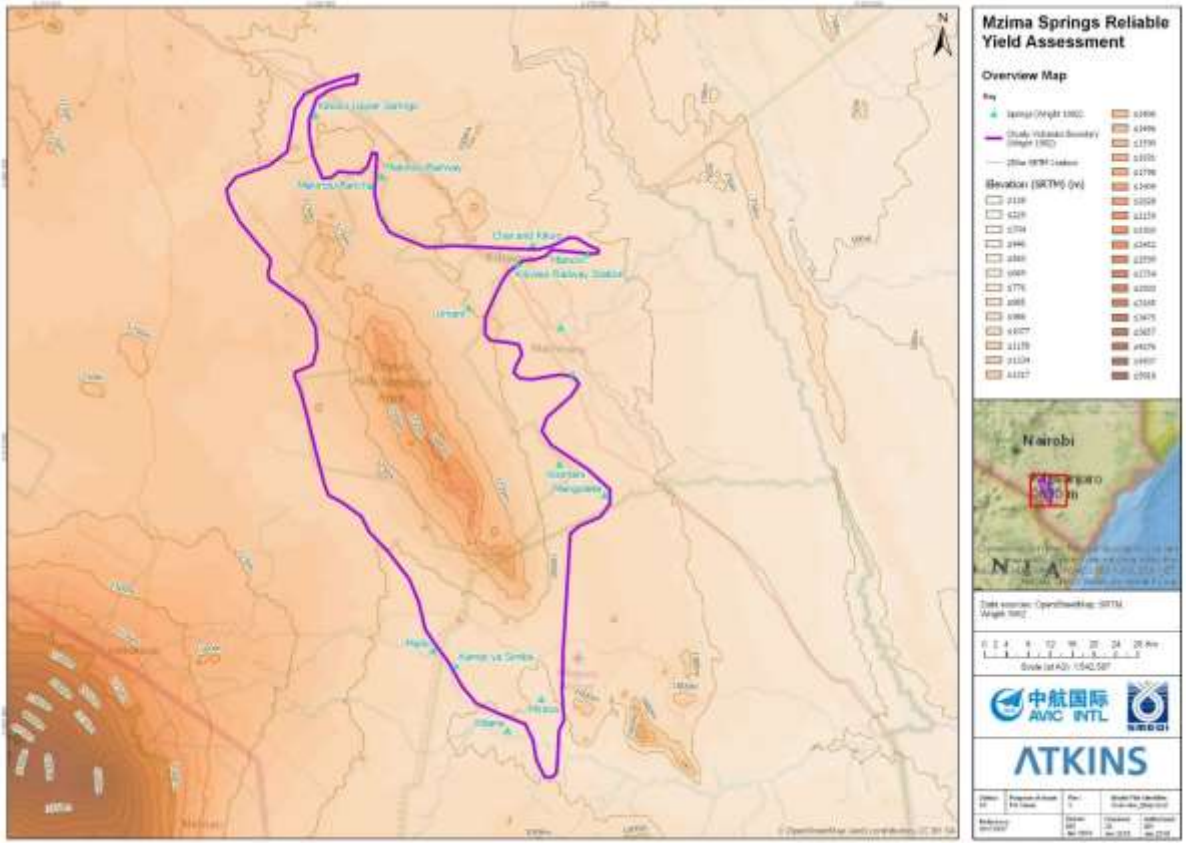

Figure 5: Mzima catchment basin (Atkins,2018)

4.11.1 Soils

Of key importance to the Chyulu aquifer area is the extremely porous nature of the thin residual soils that have evolved over the few thousands or tens of thousands of years since active volcanism ceased. The *aa* lava flows are characterised by blocky and uneven surfaces, where pockets of soil have evolved to host thick vegetation; *aa* flows often terminate as characteristic small, steep scarps. Areas underlain by thick layers of ash tend to be smooth, grassed and hosting sparse tree growth; these frequently form shallow basins surrounded by vents and hosting rich red oat grass on moderately well-developed soils.

Recent ash cones show intervening layers of ash (which dominates) and more compact deposits (*aa* lavas or less vesicular basalts), which can be seen in the flanks of some of the cones. Some erosion – which takes the form of incipient near-straight grassed and shrub-filled gullies – has occurred, suggesting that some cones are sufficiently impermeable to allow at least some overland flow; however, there is no evidence of standing water anywhere in the Hills. The BGS study divided soils in the Hills into two broad groups; soils on the flanks, and soils along the ridgeline. These can be further sub-divided into:
Hill flank soils:

- Older lavas (most developed soils)
- Intermediate (intermediate soil development)
- Young lavas (least developed soils).

Ridgeline soils:

- Soils underlying forest (the BGS estimated that only 3% / 63 km^2) of the recharge area was covered by 'montane rain forest')
- Soils underlying grassland.

4.11.2 Meteorology, Recharge and Surface Flows

The land bordering the Chyulu Hills has low and variable rainfall, supports scrub and marginal agricultural land and has been classified in the literature as semiarid to arid (BGS, 1988). BGS (1988) reported that over the period from 1904 to 1982, a large range of annual rainfall (from 67 mm to 1967 mm) had been recorded at Makindu rain gauge.

In contrast to the lower lying surrounding land, the higher ground of the Chyulu Hills receives greater rainfall and prolonged periods of mist. This results in denser vegetation cover; there is good grass cover and significant areas of well-developed forest. The climate of the higher Chyulu's has been classified as humid to dry sub humid and given the agro climatic classification of warm sub humid (BGS, 1988).

Twelve new rain gauge stations were established for the BGS study, mostly along the Chyulu Ridge, using storage gauges which were read monthly. Two unattended automatic weather stations (AWS) were also installed as part of the study, including one high on the Chyulu ridge. During the study period (1984 to 1986), the total rainfall recorded at the North Chyulu Ridge raingauge (altitude 1810 m) was 1185 mm, compared to the a total rainfall of 585 mm at Makindu (altitude 995 m). The estimated total evaporation (using Penman estimates of evaporation from vegetation, Et) at the Chyulu study AWS was 1218 mm (based on data collected Dec 1985 to Nov 1986), compared to 1438 mm at the Makindu AWS over the same period.

Across the region, there is a bimodal seasonal rainfall distribution with more rain in the "short rains" period, typically between October and December, compared to the "long rains", typically between March and May (Wright, 1982, BGS, 1988, Kiringe et. al 2016). In terms of spatial distribution, it has been found that precipitation in the eastern foothills shows a decreasing trend both north and south from a central maximum. Precipitation increases with altitude and the western Chyulu appears to be in a slight rain shadow (Wright, 1982, BGS, 1988). The altitudinal effect on potential evaporation was found to be complex, with the month to month variations

during the year, generally much greater than the year to year variations for the same calendar month (BGS, 1988).

Although further data collection was recommended, there are few measurements at altitude beyond the BGS study period (1984 to 1986). It is likely that there is variability in the rainfall distribution with altitude, aspect, and location that has yet to be characterised.

4.11.3 Recharge processes

The volcanic rocks of the Chyulu Hills are covered by a thin to negligible soil cover. There are areas of bare rock, elsewhere pockets of soil have evolved. The soil cover and rocky outcrops have high infiltration rates and there is very little surface water runoff.

Vegetation varies from grasslands with scattered trees on the plains and former ash fields through to thicket forest on some lava fields and montaine forest on the top of the ridge. These features are related both to the age of the volcanic rocks, with less vegetation on the younger formations, and to location and altitude, with denser vegetation occurring on the higher ground of the Chyulu Hills which receives greater rainfall and prolonged periods of mist.

A conceptual representation of the main recharge processes is summarised in below. Volcanic rock age, soil cover and vegetation cover have a key role in determining recharge:

- Variable rainfall has a spatial distribution strongly influenced by altitude and location.
- Where there is no vegetation, direct evaporation occurs from those parts of the lava flow surface that form puddles during rainstorm events, elsewhere evapotranspiration occurs, dependent on vegetation type.
- Surface water runoff is generally insignificant in most areas, although some flow may occur when soils become saturated in the lower ground around the periphery of the aquifer. In general, in areas where there is soil and vegetation cover, when the precipitation exceeds the water required to make up the soil moisture deficit and satisfy potential evaporation it percolates through the aquifer system.
- Where there is no/limited soil and vegetation cover, direct recharge (i.e. that which bypasses the soil moisture store) can occur by fissure flow.
- All recharge percolates to the 'base' of the volcanic aquifer to reach the water table.
- Water flows laterally to the point of lowest elevation to discharge as springs.

The Mzima springs flow regime has been the subject of several investigations. BGS hypothesised that major recharge events are quite widely separated with several years of nil recharge, except through bare lava outcrops, resulting in a routing lag (of two to three years) between rainfall and

spring discharge. Using the results of their chloride balance work, BGS tentatively suggested that the Mzima discharge at the time of the study correlated with the recharge event of 1967/68 (i.e. (i.e. a residence time of approximately 20 years).

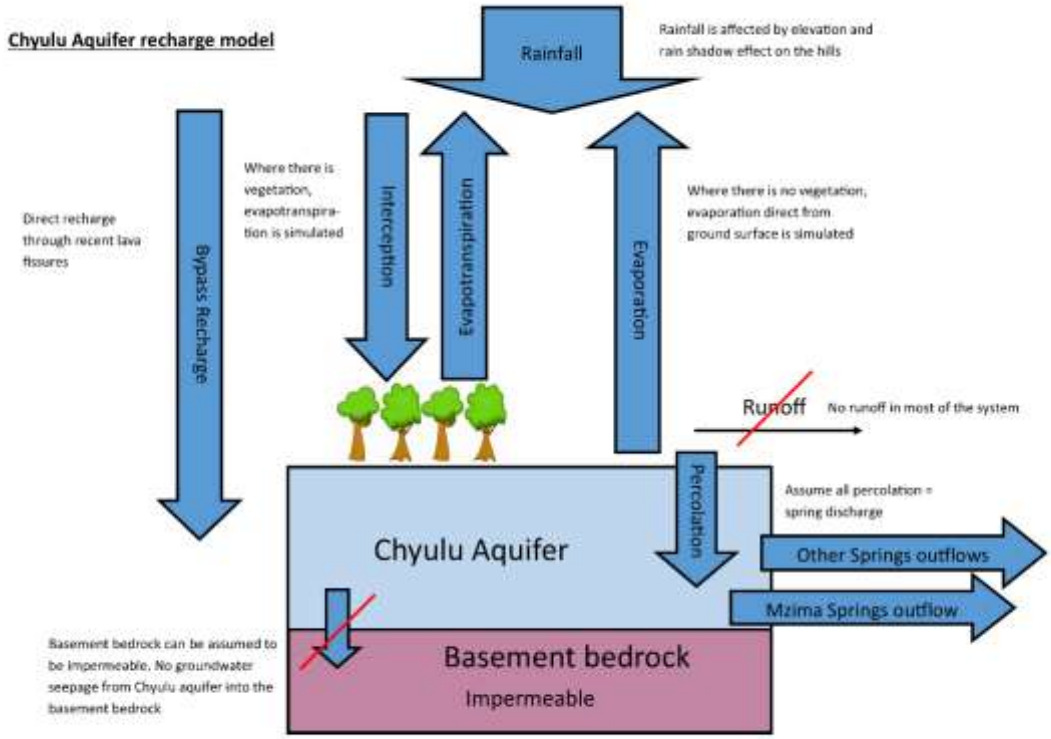

Figure 6 :Conceptual representation of recharge of Chyulu aquifer

4.11.4 Discharge

Natural groundwater discharge from the Chyulu aquifer system occurs through springs, both to the east and the west as shown in Figure 2-5. The principal discharge is from Mzima, which together with the north-eastern springs is heavily utilised for public supply (The subject of this EIA study)

Although main discharge from Chyulu aquifer is through the springs, an as yet unquantified, proportion of recharge is also distributed to other sources. The BGS study highlights that in more marginal areas, there is evidence to indicate that the basal aquifer is thin and laterally discontinuous, similar to a subsurface drainage system. Boreholes in the eastern margins show rest water levels in the underlying weathered basement rocks. It is considered that some leakage into underlying or adjacent rocks must occur, especially where these are weathered or have open

fractures. In addition, some discharge by phreatophytes is believed to occur in certain areas of low elevation. The BGS 1988 study suggests this may be the case in the Kibwezi forest/Umani swamps and also in the Iltilal area. Changes in the catchment since the 1980s (natural and anthropogenic) may have altered the proportion of discharge from phreatophytes, however the volume has never been quantified in water balance terms.

4.11.5 Reliability Evaluation Report for Mzima Springs

Hydrologic stations RGS 3G03, 3G05 and 3G02 are set near the Mzima Springs. The source of Mzima Springs is from the rainwater seepage of Chyulu Hills. After passing through three lakes (Hippo Lake, Long Lake and Chalk Beach Lake), the water of Mzima Springs flows into the Mzima River. Since 1951, the hydrologic station RGS 3G03 has made hydrological observation on Mzima Springs for continuous forty years. The observation shows that the maximum measured monthly average discharge is 5.9 m3/s, and the minimum measured monthly average discharge is 2.6 m3/s.

The water yield of Mzima Springs in 1932 - 1994 can be deduced by making the model of rainwater of the Chyulu Hills and water yield of the Mzima Springs. Water yield model shows that minimum water yield of Mzima Springs is 2.6 m3/s and the maximum water yield is 5.9 m3/s. In 2018, Atkins was entrusted to demonstrate and analyze the reliability of the Mzima Springs, and has used three kinds of data analysis form to demonstrate the sustainable water yield of Mzima Springs:

i. Validation study of historical data of spring water discharge
ii. Analysis of relationship between monthly supplementary water volume data and discharge data by using Lagged Multiple Linear Regression model
iii. Extreme Value Analysis: On the one hand, use this method to analyze historical data and sustainable discharge record data; on the other hand, analyze the data generated by the fitting of Lagged Multiple Linear Regression.

Besides, the analysis built supplementary water model of Chyulu Hills Aquifer and adjusted the model input factors such as rainfall, permeation loss coefficient and transpiration through historical data, geographic environment data and reasonable assumption. Comparing the obtained supplementary water volume model with measured and simulated spring water discharge data, and utilizing lagged multiple linear regression analysis and extreme value analysis, the relationship of rainfall, supplementary water volume of aquifer and spring water discharge can be determined approximately.

According to the analysis conclusion of reliability report of Mzima Springs from Atkins, compared with the area of this region, Chyulu Hills Aquifer and Mzima Springs can provide quite huge amount of water. The analysis indicates the importance of the existence of forested area and pyroclastic flow to the water replenishing mechanism of the aquifer. Relevant hydrology models and lagged regression analysis indicates that there is a close relation between water discharge of Mzima Springs and replenishment of water amount of underground aquifer, and taking it as a whole, the spring water yield is at least related to the water replenishment activity of the underground aquifer 10 years ago.

This indicates the high resistance of the spring water to intra-annual variation of drought and rainfall, and further indicates the low sensitivity on climatic change. Through the analysis result, the spring water yield data can be estimated to be (daily average discharge):

- Spring water discharge with 95% guarantee rate: 2.64 m3/s
- Spring water discharge with 96% guarantee rate: 2.5 m3/s
- Spring water discharge with 98% guarantee rate: 2.4 m3/s

The current spring water withdrawal is 0.43 m3/s, and the water withdrawal of Phase II Project is 1.21 m3/s, so the Phase I will be abolished after the completion of Phase II. Based on the above conclusion of spring water yield data and the water supply guarantee rate, the water withdrawal can be guaranteed even under extremely dry conditions.

Meanwhile, Atkins points out that, Baricho water supply scheme in the Mombasa Water Supply Master Plan puts forward to increase water withdrawal from the Galana Sabaki River in the lower reach. Therefore, during the implementation of Baricho Water Supply Phase II Project, it is necessary to consider the joint influence with water supply scheme of Mzima Springs, and the construction unit of Baricho Water Supply Phase II Project shall model the Baricho Wellfield and groundwater level when necessary.

The change of basin caused by the natural process will not bring too much impact on the spring water yield, while the erosion of the existing forest and vegetation covered area due to human activities will obviously reduce the groundwater recharge and then reduce the spring water yield. Through building a model, it is predicted that the probability of a decrease in water yield due to the climate change trend in the future is only 20%, and before 2080, the probability of decrease of the existing guarantee rate of water yield is only 10%.
The major recommendations are as follows:

- It is recommended to strengthen water intake monitoring
- It is recommended to increase the quantity of rainfall stations, especially in the ridge area

- It is recommended to strengthen the discharge monitoring of Mzima Springs and other major springs that take the aquifer as the water source

Because of the particularly favorable natural advantages of the Chyulu Hills Aquifer and Mzima Springs, it is also necessary to take protection measures in various forms, such as taking it as a protection strategy in particular to support the sustainable development of the basin.

4.11.6 Environmental Analysis of Water Resource

According to the reliability analysis of Atkins for the Mzima Springs, there is sufficient guarantee rate of water yield of the Mzima Springs, which can guarantee the water withdrawal of the Mzima II Water Supply Pipeline Project. According to the site survey, at present, the Mzima I Intake has collected about 1.3 m3/s of water, and the remaining spring water flows into the lake from the head of the lake. In the overflow well at the lower reach, about 0.84 m3/s of 1.3 m3/s water overflows back to the lake. The remaining 0.46 m3/s water flows through the Mzima I Pipeline for the water supply of the lower reach.

According to the environmental requirements on the flow in the Intake (2013 CWSB, Water Supply Master Plan of) , it is required that the minimum environmental discharge of the three lakes is 1.4 m3/s, while the minimum environmental discharge of the lower reach of Mzima River is 1.0 m3/s. According to the water yield demonstration above mentioned, the lowest discharge of Mzima Springs is about 2.64 m^3/s with 95% guarantee rate, and it is required that the minimum environmental discharge of the lake is 1.4 m^3/s. Therefore, the water withdrawal of Mzima Springs is about 1.21 m3/s under the minimum discharge, and still meets the water withdrawal of the Mzima II Water Supply Pipeline Project. According to *Code for Design of Outdoor Water Supply Engineering* (GB50013-2006), "when surface water is used as the water source for urban water supply, the design annual guarantee rate of low discharge shall adopt 90% - 97%". From the above table, it can be seen that the Mzima Springs water supply capacity can meet the water intake requirement of 105,000 m3/d.

Figure 7: Environment requirement for Mzima headwater resource

4.12 Environment and Climate Change

Environmental degradation is a major cause for concern in the County. The quest for development will ultimately present a challenge to the natural environment. Major contributors to environmental degradation include slash and burn agriculture, logging, poor agricultural practices, human settlement on hilltops, sand harvesting along rivers among others.

Environmental degradation poses a major challenge to sustainable development in the County. Among the effects of environmental degradation are the loss of species and integrity of habitat, habitat fragmentation and loss, and loss of water catchment areas. Climate change and variability is an emerging threat to sustainable development in the County. Although climate data from the Kenya Meteorological Department for the County is scanty, there is evidence of a changing climate characterized by increased frequency and severity of extreme events such as drought and floods.

There are observed changes in the seasons whereby the rainy seasons have reduced and the onset of the rains delayed. These changes present additional challenges to the socio-economic development of the County in a number of ways. Within the agriculture sector, which is the most vulnerable, farmers have experienced reduced yields leading to food insecurity in the County.

Rising temperatures are associated with high prevalence of pests and diseases which affect productivity both in crops and livestock. Extreme cold is responsible for frost experienced in some parts of the County. Moreover, shifting seasons means changes in planting period which in turn affects crop performance, while drought results in reduced pasture.

The health sector is also affected by climate change and variability because the rising temperatures provide an environment conducive for malaria vectors to thrive. As a result, the health facilities are confronted with additional burden. Other effects of climate change are decline in water quality and quantity, destruction of road infrastructure by floods, and loss of biodiversity.

Mitigation measures which seek to reduce Greenhouse Gas (GHG) emissions should then be elaborated. These include use of cleaner and more efficient technologies such as solar and wind. They also include those actions that aim at increasing GHG sinks such as reforestation, protection of wetlands, or any relevant change in consumption behaviors.

Other strategies to cope with climate change include water harvesting technologies, efficient water use, adoption of Early Warning Systems (EWS), awareness and education, introduction of drought resistant crop and animal varieties and proper natural resource management.

5.0 PUBLIC PARTICIPATION AND RESPONSES

5.1 Introduction

Stakeholders are 'all those people and institutions who have an interest in the successful design, implementation and sustainability of the project. This includes those positively and negatively affected by the project. Stakeholder participation involves processes whereby all those with a stake in the outcome of a project can actively participate in decisions on planning and management. They share information and knowledge, and may contribute to the project, so as to enhance the success of the project and hence ultimately their own interests'. Different types of stakeholders can contribute to the EIA process in different ways and, in most cases; inputs from a broad variety of stakeholders will complement the EIA process. Stakeholder interests exist at different levels.

Kenya has entered the era of participatory development in all matters of national life. Participation in this case is not just through elected representatives but also through direct action. The Environmental Management and Coordination Act (Revised, 2015) and its subsequent Environmental (Impact Assessment and Audit) Regulations, 2003 underscore the need for stakeholder participation in the EIA process. Neighbours of a proposed project have to live with the project if implemented. They have the most to gain if the project impacts are beneficial to them. Conversely, they have the most at stake if the project goes awry. Not just neighbours but for projects whose impacts have a wide geographical spread, distant communities need to be involved. Stakeholder input is thus vital at the earliest stage possible in project development.

5.2 Consultation Methodology

There is no single 'public'; instead there are a number of publics some of whom may emerge at any time during the process depending on their particular concerns and the issues involved. Strategies for involvement must be appropriate to the individual, the community or the region potentially being affected. A successful public involvement process must take the characteristics of the potential publics and their changing views of contentious issues into consideration:

i. Experienced in public involvement.
ii. Informed or uninformed about the issues.
iii. Hostile or apathetic.
iv. United or divided.

Suitable methods were employed for each stakeholder category (Section 2.7, above).

5.3 Objectives of Public Participation

Public participation was carried out in order to:

- Inform the local people, leaders and other stakeholders about the proposed project and its objectives;
- Initiate public involvement processes, in a bid to induce and cultivate a sense of peoples' ownership to the project;
- Suggest and facilitate the peoples' roles in the project's sustainability, in terms of management, maintenance and productivity;
- Seek views, concerns and opinions of people in the area concerning the project.
- Establish if the local people foresee any positive or negative environmental effects from the project and if so, how they would like the impacts to be mitigated;
- Find out if there are issues or places of cultural/or religious importance to the local communities that could be negatively impacted upon by the project and its infrastructure.

5.4 Aims of Public Participation

The specific aims of the consultation process are to:

- Improve project design and thereby minimize conflicts and delays on implementation,
- Facilitate the development of appropriate and acceptable entitlement options,
- Increase long term project sustainability and ownership,
- Reduce problems of institutional coordination,
- Make the resettlement process transparent,
- Increase the effectiveness and sustainability of income restoration strategies and improve coping mechanisms.

Effective public participation requires the availability of adequate information in public inputs. The latter involves various values, critiques, questions, information, suggestions and other inputs, which are expressed by individuals, groups or organizations among the general public in an attempt to influence decision-making.

5.5 Legal Requirements

5.5.1 Environmental (Impact Assessment and Audit Regulations, 2003)

Legal Notice of 101 of EMCA 1999 (The Environmental Regulations, 2003) requires that all environmental assessment process in Kenya to incorporate Public Consultation. The aim is to ensure that all stakeholder interests are identified and incorporated in project development, implementation and operation. Of necessity, stakeholder consultations should take place alongside project design and implementation to ensure that the project puts in place measures to

cater for stakeholder concerns in all project phases. In case of the proposed project, public consultations followed several.

5.5.2 Government Policy on Public Consultation

The overall objective of the Government is to involve communities in policy formulation and implementation at the local level. More specifically, the Community Action Planning Programme objective is to put in place a durable system of intra-community co-operation through collective action, which creates communal discussion forums for the implementation of development activities.

5.6 Identification of Stakeholders

Like in all civil works projects, the core stakeholders (Coast Water Services Board), opinion leaders within the community; local politicians; County leaders, Sub-County commissioners; Sub-County officers; area chiefs and their assistants and people staying along the pipeline corridor were consulted. This is the group that is likely to benefit or be affected by the proposed development. This study also identified a second category of stakeholders comprised of GoK officers in charge of diverse sectors, which are likely to be impacted by the Mzima II project. This category was also consulted as key informants on sectoral policy and to advise this EIA study on mitigation measures to be put in place so as to minimize adverse impacts in respective sectors. Each category of stakeholders called for a different approach to consultation.

5.7 Methodology

Public participation was mainly achieved through direct interviews, observations, questionnaire administration and public barazas with the area chiefs as discussed below. The EIA team began the public consultation process by holding preparatory meetings to strategize on how to engage the stakeholders in the EIA process together with the chiefs and the assistant chiefs, who helped in the process of identification of the significant actors/stakeholders who could provide data relevant to the proposed project. The following is a detailed discussion of public consultation methodology used by the EIA team.

5.7.1 Direct Interviews

Direct interviews were conducted with Coast Water Services Board, TAVEVO, KWAWASECO, opinion leaders within the community; local politicians; County leaders, County commissioners; Sub-County Officers; area chiefs and their assistants in ten different venues between 2nd and 9th May 2018. Others include representative from the national government ministries. Their

comments were sought through engaging them in discussions about the proposed project and the benefits that are likely to accrue as a result of its implementation. This kind of engagement gave the respondents the opportunity to give insights and details about the issue at hand.

Plate 5: Consulting Board of Directors TAVEVO

Plate 6: Consulting the Chief Officer (Water and Irrigation) Taita Taveta County

Plate 7: Interviewing Assistant County Commissioner-Kasemeni

Plate 8: Interview with MD Kwale Water and Sanitation Company

Plate 9: Interview with County Secretary- Kwale County

5.7.2 Questionnaire Administration

Questionnaires were prepared and administered to 1000 households in 10 locations along the corridor of the proposed Mzima II pipeline. The team then organized visits to meet the representatives of all the stakeholders identified, whom they met and spent considerable time with, and held discussions with them on their opinions about the proposed project.

5.7.3 Community Consultative Meetings

Ten (10) community consultative meetings were held in ten different venues between 2nd and 9th May 2018 as a way of reaching as many stakeholders as possible (Table 3 Below and Plates 6-15). It was meant to give more members of the stakeholder community an opportunity to express their views, fears and expectations, if any, about the proposed project. In attendance were: area Chiefs (conveners), Assistant Chiefs, opinion leaders, and representatives from CWSB and project affected persons.

Table 11: Consultative meetings held

Date	Time	Location	Venue	GPS Coordinates		Number of Participants
				Easting	Northing	
03-05-18	10am	Kasemeni	Chief's Office	E039^{0}32.047′	S03^{0}56.268′	221
03-05-18	10am	Mwavumbo	Kalalani Chief's Office	E39^{0}27′15.304	S3^{0}50′57.048	237
03-05-18	12pm	Mwatate	Kafuduni Assistant Chief's Office	E039^{0}29.914′	S03^{0}54.534′	230
03-05-18	12pm	Samburu	Chief's Camp	E39^{0}15′42.881	S3^{0}47′45.396	172
03-05-18	3pm	Taru	Chief's Office	E039^{0}09.047′	S03^{0}45.402′	153
03-05-18	3am	Mackinon Road	Muslim's Hall	E039^{0}01.755′	S03^{0}43.248′	67
08-05-18	10am	Maungu	Chief's Office	E038^{0}44.986′	S03^{0}33.550	177
08-05-18	10am	Voi	Sofia Bona Grounds	E039^{0}27′15.304	S03^{0}50′57.048	208
08-05-18	2pm	Mbololo	Tausa - Jukwaa	E038^{0}32.573′	S03^{0}23.994′	154
08-05-18	2pm	Ngolia	Chief's Office-Ndii	E038^{0}29.643′	S03^{0}06.122′	125

Plate 10: Consultations in Kasemeni

Plate 11: Consultations in Mwatate location

Plate 12: Consultations in Samburu Location

Plate 13: Taru Location consultations

Plate 14: Community engagement in Mackinnon road


Plate 15: Maungu location consultations


Plate 16: Consultations in Voi

Plate 17: Hon Omar of Kaloleni Ward address community in Voi


Plate 18: Consultations in Mbololo location


Consultant Explain Mzima II project in Ngolia

A community member contributing during the Ngolia Consultations.


Proceedings in Ngolia location

Ngolia Ward MCA, Honourable making his point

Plate 19: Ngolia Consultations

5.8 Outcomes of Public Consultation

In all the public barazas and public consultations held, the project enjoyed overwhelming public support. No opposition was encountered during the field survey. There was a general consensus that this project has been longed for in many years. In spite of this, some concerns were expressed by diverse sections of the public. These concerns however pale in comparison to the benefits that Mzima II pipeline will bring to the community.

5.8.1 Acceptance of the Project

Most people who attended the public barazas support the proposed project. This support is from the fact that it will guarantee supply of clean drinking water. Considering the biting shortage of water in the entire area, the participants actually felt the project should have been implemented much earlier. Few who objected fear being resettled because they are not sure of compensation and may be displaced completely.

5.8.2 Compensation

The PAPs raised concerned of them being displaced by the project. What is to be compensated and when shall they be compensated? It's the structures being compensated. They are to be compensated before they can move/before demolitions. The relevant legislations and other guidelines such as the World Bank standards on compensation shall be observed.

5.8.3 Operation and Maintenance of the Mzima II Pipeline

The community was concerned if they will be involved in the construction phase of the project. They were informed that the community will be involved in all phases of the project development and this project can be an avenue for youth involvement. The existing pipeline will be in use till the Mzima II pipeline is operational.

5.8.4 Role of Project in Supporting GoK and County Government Policies

Though discussions with stakeholders in Government, it was clarified that GoK is committed to creating an environment favourable for attaining sustainable development in line with the Vision 2030 and the Agenda Four and the county governments strategic development plans (Kwale and Taita Taveta). The construction of the pipeline will supplement water demands for Mombasa, parts of Kwale and Kilifi counties.

5.8.5 Potential Damage to Existing Infrastructure

Water operators, Kenya Power have extensive infrastructure in form of pipelines and power distribution lines currently utilizing the road reserve. There is great apprehension that a wrong move during pipeline construction could damage and possibly occasion untold damage and interruptions to strategic operations with huge economic implications. The requirement here is for the design team to work closely with all the operators along this pipeline.

5.8.6 Potential Interference to Business Operations

Without exception all operators along the access roads are concerned that pipeline construction activity will compound the current traffic congestion and thus affect their businesses. The request by all actors is that implementation of the project should never interfere with flow of traffic.

5.8.7 Employment

It was the wish of the stakeholders that priority of employment opportunities for skilled, semi-skilled and unskilled labour, be given to the local residents. However, if the local residents do not have adequate or none at all of the skilled labour, then these can be sourced from outside the region. It was agreed that the modalities and quotas for employment for different locations be agreed upon by the local residents, local administration and the contractor especially between Kwale and Taita Taveta Counties.

5.8.8 Potential for Increased Economic Activities

The residents are optimistic that upon completion of the Mzima II pipeline project, that more opportunities for business will be realised. Another additional benefit will be increased water supply, reduced water shortages, control of water leaking from the busted pipeline, reduced costs for break down and maintenance costs associated with old pipeline.

5.8.9 Long-Term Sustainability

Many stakeholders are quite clear that the proposed project should not lead to environmental degradation and require that comprehensive assessment of potential impact areas be carried out on material borrow areas, civil works sites, fuel storage/maintenance. There was a unanimous suggestion that such sites should be on public land to avoid future conflicts.

5.8.10 Occupational Health and Safety

Heavy truck and equipment / machinery in the project area are hazards that pose various risks to the persons operating and working with such equipment. The Occupational Safety and Health Act (OSHA), 2007, stipulate the measures that ought to be taken by an employer, in this case the contractor, so as to offer mitigation against the risks. Workman's compensation Act makes it mandatory for any employer to take insurance cover for their staff.

Apart from the occupational health and safety, the heavy trucks moving from one point to the other are a hazard to other road users with risks and consequences leading to serious injuries and even fatalities. Awareness to the general public will be required and accidents arising from such will be treated under the Traffic Act.

5.8.11 Project Timeframe

The local residents were keen to know when the construction of pipeline will start. The process involved and the estimated timing in the design, design approval, budgeting and tendering process was explained, and the estimated waiting time was given in line with the proposed timeframe as in the project network. It was also strongly articulated that the time frame should be observed to reduce community-outsiders contact to avert conflicts.

Potential negative impacts identified by the community members have been addressed in the Environmental and Social Management Plan in Chapter 7.

6.0 POTENTIAL ENVIRONMENTAL IMPACTS

6.1 Introduction

A study of potential environmental impacts as a result of the proposed Mzima II Pipeline project was carried out. From observations made in the field and discussions held with various people, a number of aspects affecting the natural, physical, economic and social environment were noted. These observations are also intended as useful pointers during the design stage of this project.

Once potential impacts of the proposed project were identified, the team went further to predict the nature of the impacts. Predictions are normally based on explicit assumptions about environmental processes, professional judgment and different value judgments expressed by various stakeholders during consultations. Determination of the significance of the potential impacts was based on the three broad categories of determining impact significance. These are:

- Legal: The importance of environmental conservation is acknowledged in existing policies, laws and plans (Task 3, above).
- Public: segment of the public recognize the importance of environmental conservation. This recognition takes place in the form of support and sometimes conflict and opposition.
- Technical: the importance of an environmental resource is based on the scientific knowledge of the critical resource characteristics.

Environmental impacts manifest at all stages of a project. This is because of the different project activities that inform particular actions which in turn act on environmental factors. The significance of these impacts is also varied. These impacts manifest during Preconstruction, Construction, Operation and Decommissioning Phases of the proposed project. The impacts vary in severity, duration, spatial extent, and reversibility among others.

Table 12: Scale for evaluation of project impacts

SCORE	(-1) +1	(-2) +2	(-3) +3	(-4) +4	(-5) +5
PARAMETER					
Magnitude	Impacts occur or are felt on site		Impacts affect more than 3 kilometers radius		Impacts affect the region
Significance	**Low** Small changes which are hardly detectable	**Moderate** Impact measurable but does not alter processes	**High** Many people, animals, plants affected. Disruption to ecosystems and social systems.	**Very high** Loss of biodiversity, property, livelihood systems	**Unknown** effects Insufficient information available. Apply precautionary principle
Probability of occurrence	**Possible** Impacts can occur but are controllable		**Probable** The impact is likely to occur but can be controlled by effective measures.		Definitely will occur
Duration of occurrence	**Short term** During construction phase only	**Medium term** Impacts will be during operational phase only		**Long term** Impacts will be there for entire operation phase	**Very Long term** For the entire operational phase and after closure

6.2 Potential positive impacts during construction

The proposed project has a host of potential positive impacts. These will be experienced at the different phases of the proposed project. However, some are phase specific.

6.2.1 Employment

There are various socio-economic benefits that are likely to result from the project. This will be during the pre-construction, construction and operation phases of the proposed project. Of importance is employment creation during the construction phase. The existing policy is that all

unskilled labour force for any project be sourced from the local community unless such a population is not available. The local population will be engaged in the site as skilled, semi-skilled and unskilled workers to provide various services.

During the pre-construction phase, casual workers will be involved in clearing the site and removing the vegetation from the site. Members of the local community who possess skills such as driving and operation of heavy equipment could also be engaged drivers or machine operators. During the operation phase, there will be opportunities for permanent employment.

6.2.2 Growth of secondary businesses

Many secondary businesses could come up in the area especially during the construction phase. Some key businesses include supply of spare parts for machinery to the contractor and private individuals, supply and maintenance of furniture, office equipment and stationary. Major informal businesses include food business, public transport and hospitality services among others.

The implementation of the project will generate a lot of benefits not only in project area but also beyond. Nationally, the project will be a contributor to the economic growth of the country in terms of taxes, offering direct employment to those in water companies and water user associations. It will also contribute towards the realizing the goal of Water for All.

6.2.3 Revenue to the Exchequer

This will be in form of various licenses that the proponent will have to acquire at different phases. The government will also earn through various taxes during procurement of materials for the constructing the proposed project. Other sources of income to government are the taxes paid by the employees of the proposed project.

6.2.4 Infrastructure development

The proposed project will result in improved road network especially along the pipeline corridor. This will be necessary to facilitate routine maintenance. Thus local community will benefit from this improved road network. Currently, the service road for Mzima I is greatly destroyed. Thus movement by motorists and pedestrians will be enhanced. Other benefits from the improved access road touch on new business opportunities.

6.3 Construction Phase Potential Negative impacts

6.3.1 Water pollution

The activities involved in this phase of the development may cause a negative long-term impact on the surface and ground water quality within the development area. This will be as a result of many of the activities which are slated to take place in these phases which includes the possible storage of hazardous substances on the site such as diesel and motor oil for the operation of machinery and stand-by generators, and the storage of raw material for the construction of buildings and roads *inter alia*.

The clearing of the vegetation within the development area may also have a synergistic negative long term impact on the water quality in the area as well. The removal of vegetation will increase the runoff and therefore sedimentation will increase in these areas as well. Inappropriate treatment of sewage generated from contractor's campsites may also have a negative impact on water quality.

- Sanitation facilities shall be located within 100m from any point of work, but not closer than 50 m to any water body.
- All temporary/portable toilets shall be secured to the ground to prevent them toppling due to wind or any other cause.
- Only approved portable toilets should be used.
- These facilities shall be maintained in a hygienic state and serviced regularly.
- The contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from site to an approved disposal site.
- Discharge of waste from toilets into the environment and burying of waste is strictly prohibited.
- Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas, which include groundwater, are not polluted.
- Containers of chemicals and hazardous substances used on the sites should be confined in secure holding areas before disposal to approved sites by licensed waste handlers.

6.3.2 Soil erosion and contamination

The activities involved in the site preparation and construction phase of the development may have a major negative short-term impact on soil and geology of the project site. This is due to the removal of vegetation from the area which will leave considerable areas of soil exposed to the elements, which may result in soil erosion.

Heavy machinery will be traversing the site due to the construction activities and this may lead to soil compaction and erosion. Hazardous substances such as diesel used for the operation of machinery and stand-by generators, may be stored on the contractor's campsites. This may have a significant negative long-term impact on soil quality in the area.

- Limit clearance of vegetation only on the way leave as much as possible to minimize exposure of soil to agents of erosion.
- Put up barriers to protect soil from erosion along the pipeline route where there are steep edges.
- Service machines, vehicles and heavy equipment to ensure there is no spillage of oil and greases during operations.
- Labelling all hazardous substances and providing work instructions in their use.

6.3.3 Noise & Excessive Vibration

The site preparation and construction phases of the development usually have the most negative impact to the ambient noise and vibration in the development area. Noise and vibration will be generated by excavators, vibrators and other heavy machines. A number of measures may be undertaken by the developer/s to reduce the impact of noise on the existing and potential residents as well as the workers involved in the project. This is temporary, however, and the aim at this point is to make the increase in noise as small as possible until this phase is complete. The cumulative impact of the construction activities occurring simultaneously with the other proposed developments for the area may increase the noise and vibration levels in the area significantly.

Mitigation

- Prevent exposure of construction workers to unacceptable noise levels.
- Minimize construction through night time whenever possible.
- PPE for workers operating machines that are generating noise and vibrations that can be injurious to their health.
- Limit construction to day time only unless with special permission.

6.3.4 Impacts on Biodiversity.

i. Habitat loss, degradation and fragmentation

The implementation of this project might lead to habitat loss, degradation and fragmentation. Some of the operations including during implementation and decommissioning stage will involve use heavy machinery for trenching, making of service roads and moving of pipes and other equipment. Heavy machinery will have adverse environmental effects including soil erosion and reduced water quality due to sediment run-off to water bodies thus reducing

aquatic habitat quality. Trenching and establishment of service track will lead to habitat fragmentation and interference of animal movements.

Mitigation measures

- Restrict the operations relating to installation of the new pipeline to the existing pipeline wayleave,
- Restore cleared areas as soon as the pipes are installed and ensure landscaping to minimize soil erosion.
- Earthworks in ecologically sensitive areas including steep hillsides and river crossings need to be carried with great caution.
- Leveling and replanting and should be made mandatory.

ii. Interference with wild animal distribution and ranging patterns

Infrastructural projects interfere with the distribution of wild animals. In a study by Benítez-López et al (2010) reported that mammal and bird population densities declined with their proximity to infrastructure. Avoidance of infrastructure was more pronounced in open areas compared to forested areas probably due to reduced visibility of the infrastructure in forested areas. However, species vary in their response to infrastructure with raptors being abundant in the proximity of infrastructure whereas other bird taxa tend to avoid it. Mammals are usually more affected by infrastructure than birds being affected over larger distances than birds.

Mitigation

- Use of less noisy machinery and equipment,
- Use of minimal number of vehicles and other equipment in the national parks
- Using an optimal workforce.
- Worker's camps should be located outside the national park.
- Construct the project within the set timelines to reduce time of operations in the protected areas.

iii. Potential for human wildlife conflicts – the risk of death or injury among workers

The workers might encounter many dangerous wild animals including crocodiles and hippos at Mzima Springs and elephants, Rhinos, buffaloes, lions, leopards, poisonous snakes among others. As shown in Figure 2, elephants and other dangerous animals can be encountered anywhere along the project area within the parks and also in areas beyond the park boundaries. Project implementation particularly within the parks will inevitably interfere

with animal feeding habits, behavior and ranging patterns, which often leads to human-wildlife conflict.

Mitigation measures

- Reducing the human footprint associated with water pipeline will be limited through controlling the number of workers allowed project site during the implementation, operation and decommissioning phases.
- At the beginning of the project, the workers will need to be briefed on the dangers they will be exposed to while working in wildlife habitats. They will be educated on how best to behave and protect themselves from dangerous animals.
- The workers should be accompanied by armed KWS rangers while working in the parks and other wildlife rich habitats.

iv. Interference with tourism activities

Some of the operations particularly during the project implementation and decommissioning phases will interfere with tourism activities. Mzima Springs is one of the most important tourist attractions in Tsavo West National Park and the operations related to this project will reduce the scenic appeal and interfere with the level of enjoyment that the tourists experience. Other tourist hotspots include watering points and salt licks.

Mitigation

- It will be crucial that the work at these sites be carried out as fast as possible and with as minimal impacts on biodiversity and aesthetics as possible.
- Pipeline trenches and other excavated sites should be covered as soon.
- Where practical, most of the work should be timed to coincide with low tourism season/time of day.

v. Increased poaching of wild animals.

Poaching of elephants and rhino is major conservation concern in the Tsavo ecosystem (KWS, 2008). Other animals including antelopes, giraffes, zebras, buffaloes and game birds may also be poached for their meat. Other animals for example pancake tortoise (*Malacochersus tornieri*) may be smuggled as pets (Malonza 2003). Some of the workers engaged in the project implementation and decommissioning stages may be tempted to engage in this illegal activity either for subsistence needs or for commercial gains. This may be countered through by instituting some of these measures:

- Security agencies including Kenya Wildlife Service (KWS) should increase anti-poaching effort
- Avoiding establishment of workers' camps inside the parks and other wildlife rich habitats, in the area and minimizing human traffic within the area of operation.

- Enlisting the support of local community in ant-poaching activities
- Sensitization of the workers and members of public on the importance of wildlife conservation, wildlife legislation particularly of the new the Wildlife Act 2013 (GOK, 2013), which has legislated very stiff penalties for wildlife poaching especially when endangered species are involved.
- Vetting all workers who will work in the park sections of the pipeline. This will ensure that only people with no criminal records are allowed in the park.
- Strict observance of Park Rules and Regulations.
- Inspection of all construction vehicles entering and or leaving the protected areas of Tsavo National park.
- Creating a manned entry near for example at Ndii where the pipeline exits Tsavo West. The same case should apply for Tsavo East.
- Embedding KWS personnel to the Resident Engineer's (RE) Office to ensure that the Contractor does not operate in any way that is prejudicial to conservation of flora and fauna in Tsavo East and West.

vi. Spread of Zoonotic diseases, Gastro Intestinal parasites and other pathogens

The presence of many workers can lead to the spread of zoonotic diseases particularly is no sanitary facilities are provided. Examples of zoonotic diseases that can affect people and/or wild animals include rabies and anthrax. Nonhuman primates have acquired measles from tourists (Wallis and Lee, 1999). Inappropriate disposal of human waste can lead to transmission of human gastrointestinal parasites to wild primates.

Mitigation Measures

- Ensuring that construction workers observe hygiene.
- Providing mobile toilets to workers.
- The worker's camps should be located outside the national Parks so as to reduce workers contact with wild animals.
- The workers should be educated on the need to avoid feeding wild animals and to dispose of waste appropriately.

vii. Spread of invasive species

Already some areas of the Tsavo ecosystem ecosystem are severely impacted by invasive species including *Lantana camara* , *Datura stamonium*, *Prosopis julifora* and *Opuntia stricta* (TCA Management plan,20108-2018; Boy and Wii, 2013). Invasive plants may be introduced unintentionally by workers. Earthworks including movement of soil and may facilitate the spread of invasive species.

- The pipeline route should be monitored and remedial action taken should this or other invasive species be noticed in along the pipeline either during the implementation or the operation stages of the project.
- Movement of soil for service road construction will be limited to avoid spreading invasive species.
- Clean all machines and vehicles before and entering the protected areas.

viii. Accidental injury and deaths of wild animals

Use of tractors other equipment can lead to death of wild animals. This is likely to affect slow moving animals like tortoises and other reptiles and amphibians. This can be mitigated by ensuring that slow moving animals are physically removed from work area. Increased vehicular traffic in the in the national parks and other wildlife rich areas can lead to increased incidences of road kills. In addition, open trenches can injure or even kill animals.

- This can be mitigated by educating the drivers on the legal speed limits in conservation areas.
- Laying the pipeline and covering the trenches within the shortest time possible.
- Limiting the time of open trenches in the park to maximum 24 hours and a length of not more than 200 metres each day.
- Adherence to Parks Rules and Regulations.

6.3.5 Occupational accidents

Accidents do happen in construction sites. These accidents could be mild or fatal depending on various factors. Victims of accidents are not only workers but also other third parties such neighbours, passers. Use of heavy machinery in site clearing presents safety hazards. Vehicular movements can cause accidents resulting in injuries and probably death. Operation of machinery can also lead to accidents with differing fatalities. Accidents could result from the following among other causes:

- Poor judgment by the operator or driver.
- Operation of equipment by unqualified persons.
- Operating faulty machines.
- Poor visibility.
- Exhaustion by operators.
- Operating machine or driving while under influence of alcohol or drugs.
- Carelessness.
- Abuse and misuse of machine.

- Failure to use safety gear.
- Falls while working in elevated positions.
- Collapse of pits or trenches while workers are inside.
- Attacks by dangerous animals while working in the protected areas of Tsavo West or East National Parks.

Mitigation measures

- Provision of appropriate working tools such as climbing ropes, safety shoes and helmets
- Display at prominent places occupational health and safety rules.
- Test and approve equipment such as ladders before use.
- Training workers on how to use various PPE and proper use of machinery.
- Routine maintenance of machinery.
- Right machine for right work.
- Enforcing a strict alcohol and drugs policy in the project cycle.
- Engaging only competent personnel to handle machinery.
- Appropriate informational and warning signs.
- Compulsory training on safety precautions to be observed while working in national parks.
- Contractor to get security from Kenya Wildlife Service (KWS) for workers at all time while there are project activities within the parks.
- Project activities within the Parks to be carried out only during the permitted hours unless the Contractor has a special undertaking for which permission form KWS has been asked and granted.
- Have trained First Aiders and well stocked First Aid boxes at accessible locations in the proposed project.

6.3.6 Disturbance of traffic and difficulty of access

The main impact on roads traffic will be during excavation and laying of the pipes along, or across main roads. Longitudinal excavation will cause narrowing of the roads in some sections for relatively long periods, while lateral crossing of roads may cause blocking of the road but for a relatively short period, probably few hours. The vehicle flow will thus be interrupted during such moments.

Excavation in residential areas will cause access problems to pedestrians, and possibly to riders of animals, motorcycles and bicycles. This access difficulty will have more impact on elderly people, handicapped and children. This vulnerable group may accidentally fall in open trenches or make tedious long cycles before they reach their targeted locations.

Mitigation measures:

- Traffic department should approve crossing plan prior to construction, and should approve obstruction times during construction.
- Access of residents should be facilitated by installing appropriate temporary bridges over the pipeline trenches.
- Suitable warning signs should be placed at near locations and should be visible at night.
- A guard should be available 24 hours to help people access across pipeline trenches.
- Alternatives access ways should be communicated to the community
- Provide Marshalls to assist the elderly, school children, expectant mothers and Persons With Disability (PWDs) cross the trenches.

6.3.7 Risks of Damaging Underground Infrastructure

During excavation for laying the pipes there are risks of damaging underground potable water pipes, telecommunication or power lines. This will be associated with cutting water, communication or power services and ponds of water in excavation trenches. Thus interruption of such services may this be experienced.

Mitigation measures

- Collecting available maps for infrastructure routes.
- Excavating manual trial pits to locate the underground infrastructure facilities before using mechanical excavation.
- Notify the relevant service provider in case of accidental damage.

6.3.8 Effects on Structural Integrity

During excavations of trenches, vibrations from excavators may affect the stability of the buildings near the proposed pipeline in the built up areas. Affected buildings may crack and thus impact on their safety. The owners may experience losses from the short to the medium term since such structures may be rendered uninhabitable. Apart from economic losses, the psychological suffering may be immense. Disruption of the social aspect of such families may also result.

Mitigation measures

- The geotechnical report should include suitable measures for confining vibrations within project sites. These measures should be tailored according to the proximity of buildings to the project sites and earthwork program.
- These recommendations identified in the geotechnical report (such as secant piling or sheet piling or establish cut-off walls) should be implemented by the contractor and supervised by Environment Health and Safety Advisor.

- No blasting should take place while excavating in built up areas.
- Use manual excavations as much as is practicable.

6.3.9 Chemical Exposure

This is a major short term potential negative impact. Chemical such as paints, oils and grease will be used on different aspects of the proposed project. Those handling them risk heath if certain measures are not observed. However, the risk is not limited to handlers only other third parties can also bear the brunt of improperly handled chemicals from the construction of the proposed project. The containers of pants for example should be disposed of by licensed waste handlers.

Mitigation Measures.

- Material safety data sheets of all chemicals used during construction will be kept in a register by the contractor
- The contractor to have procedures in place regarding emergencies relating to chemicals and dangerous goods consistent with the existing legislation.
- Records will be kept on the existing inventory, storage location, personnel training and disposal of waste for all chemicals and dangerous goods used on site
- All relevant construction workers will be trained in appropriate handling, storage and containment practices for chemicals and dangerous goods in relation to their position.
- All spills will be cleaned immediately

6.3.10 Liquid Effluents from Contractor's camps

The size of the project implies that there will be relatively large labour force. Some of the workers will be housed in a contractor's camp for ease of movement and to save transportation costs. The liquid waste generated in these camps if not properly disposed can contaminate source and ground water especially where the water table is high. It can also be a source of offensive odours.

Mitigation measures

- Provision shall be made for employee facilities including shelter, toilets and washing facilities.
- Toilet facilities supplied by the contractor for the workers shall occur at a minimum ratio of 1 toilet per 30 workers (preferred 1:15).
- The exact location of the toilets shall be approved by the Public Health Department prior to establishment.
- Sanitation facilities shall be located within 100m from any point of work, but not closer than 50 m to any water body.
- All temporary/portable toilets shall be secured to the ground to prevent them toppling due to wind or any other cause.

- The contractor shall ensure that the entrances to toilets are adequately screened from public view.
- Only approved portable toilets should be used.
- These facilities shall be maintained in a hygienic state and serviced regularly. Toilet paper shall be provided
- The contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from site to an approved disposal site.
- Discharge of waste from toilets into the environment and burying of waste is strictly prohibited.
- Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas, which include groundwater, are not polluted.

6.3.11 Solid Wastes

Solid waste from the proposed project will be generated from many streams. These include waste metal pieces from the pipes, cement bags and paint cans among others. Where they are left to pile up, there is the likelihood of attracting scavengers who in certain instances can pose security challenges. Tins can trap water and provide breeding ground for mosquitoes which spreads malaria. The contractor's camps will also generates copious amounts of wastes especially organic waste from the kitchens.

Mitigation measures include:

- The contractor should segregate hazardous waste, which will be safely transported to a hazardous waste facility, from non- hazardous waste which will be transported to approved disposal sites by NEMA.
- Removed sewage from cesspits, that will be replaced, and cesspits used by construction workers camps should be removed by tankers and disposed at approved sites. Garbage collected from construction sites should be disposed at appropriate sites approved by NEMA.
- Inert construction wastes should be appropriately collected and disposed in approved disposal site.
- Sell metal to authorized scrap metal dealers

6.3.12 Population Displacement

The proposed project will follow the already existing wayleave parallel to Mzima I. However, it is worth noting that there are some cases where certain individuals have encroached the wayleave in varying degrees. Encroachment is in the form of farming, construction of structures and carrying out other businesses on the pipeline route. The structures on the wayleave will have to

be demolished for the pipeline to occupy its place. Thus, displacement may be physical in the case of those with structures or economic in the case of those with open air businesses on the wayleave.

Mitigation measures:

- Prepare a Resettlement Action Pan (RAP) for the proposed project with:
  - vi. A comprehensive census of Project Affected Persons (PAPs).
  - vii. Asset Inventory of the PAPs.
  - viii. Cutoff dates that are reasonable.
  - ix. Compensation rates, procedure and Schedule
  - x. Grievance Redress Mechanisms.

6.3.13 Fire outbreak

Fire hazards are more likely in the contractor's camps where inflammables s such as paints, and solvent such as thinners and turpentine are stored. The threat is multiplied in case there are open fires where such are kept. Electric faults can also trigger fire whose damaging effects may vary depending on how fast and appropriate the response is.

Mitigation Measures:

- Label all inflammable materials and sore them appropriately
- Provision of adequate firefighting equipment capable of fighting all classes of fire
- Put " No Smoking Signs" in areas where inflammables are stored
- Train workers on the use of ire fighting equipment
- Label fire exits and keep them clear.
- Display a list of emergency contact numbers prominently

6.3.14 Spread of HIV and AIDS

The influx of migrant workers working away from their families and the resulting changes in sexual behaviors, increase chances of escalation of STI's including the HIV and AIDS. These will increase both mortality and morbidity in the project area and beyond. The ripple effect is orphaned children, widows and widowers, loss of productive workforce, burden on health service providers and drop out from schools where parents or guardians die. There could also be cases of unwanted pregnancies as the migrant workers interact and get into relationships with the local communities. In this case, there is a vulnerable group of school going girls who abandon their schooling to nurse babies and fall into the vicious circle of poor young unwed single mothers.

- Sensitize the migrant workers and host community on risky sexual behaviour.
- Have VCT services on site and encourage workers to undergo the same.

- Provision of protective devices such as condoms.
- Ensure project is completed within the set timeframe to minimize the contact.

6.3.15 Social and cultural conflicts

The proposed Mzima II project has elicited mixed reactions and created high expectations among the different categories of stakeholders. These expectations include among others; assurance of uninterrupted water supply, jobs during the construction phase, business opportunities during construction, political recognition and hefty compensation among others. The question of employment and political capital from the proposed project rank highly as prominent conflict triggers. These, if not properly handled will lead to unending feuds among community members, contractors and the proponent. Social conflicts also can result from the presence of workers from different cultural backgrounds. Sometimes the host community may feel that migrants are behaving in ways that are an affront to their (host's) cultural believes and practices.

Mitigation measures:

- Sensitize migrant workers on key cultural sensitivities of the host community.
- Ensure fairness in recruitment of workforce by ensuring that local people get priority of the jobs that they can perform.
- Create open communication for people to channel their grievances to avoid rumours and fake news with respect to the proposed project.
- Engage with local leaders at all times.
- Create a project committee with representation of all actors.

6.4 Positive Impacts during the Operational phase

Upon completion and commissioning, the proposed Mzima II project will result in a host of positive impacts. These include:

6.4.1 Improved well-being of women and children

At the household level, women and children (especially girls) bear the burden of fetching water. Other than the time spent in getting from long distances, this practice has far reaching consequences on their health and well-being. Constant water in homesteads would translate to time saving by the women. Time saved thus would be invested in other engagements that could bring financial benefits to the family. Children also bear the brunt of water borne diseases while women are tied down to provide nursing care to the sick family members. With access to a safe water source, all these negative impacts will be reversed in the project area. The reduced morbidity due to water from unsafe sources will mean financial savings by households.

6.4.2 Enhanced Water supply which translates to improved psychological well-being of households

Water shortage is a major stress factor in households in the project area. Public consultation meetings found that this stress comes in various ways such as the extra cost incurred in paying water vendors. This is added by the knowledge that the water so supplied is not safe. It is compounded by disease burden caused by consuming such water. Other than that, the inability to maintain the desired level of hygiene and cleanliness due to water shortage adds to the stress. With a constant water supply from the proposed project, the psychological well-being of household members will be greatly enhanced. This is the main overall positive impact from the proposed project.

6.4.3 Employment

The management of extra facilities that will come with Mzima II requires recruitment of new staff. While some will be on permanent basis, others will be on Contractual casual basis. This will translate to incomes and improved lives for the households in question.

6.4.4 Increased Profits for Businesses in the Project area

Water shortage has been a key hindrance to business growth in towns in the area. It is also a major cost that eats into profit margins of businesses. In tourist facilities for instance, it was reported that they spend large volumes of detergent in laundry due to reliance on salty water from boreholes. The water also corrodes pipes. To provide clean drinking water for their clients, these hotels employ expensive water treatment techniques cutting their margins further. Implementation of the proposed project will alter this state of affairs. A constant water supply from the proposed project could go a long way in boosting business growth in the town along the pipeline corridor while minimizing cases of water borne diseases. This will translate into a host of other benefits such as employment and increased incomes for those engaged in business.

6.4.5 Revenue to the Exchequer

This will be in form of various licenses that the proponent will have to acquire and pay during the operation phase. For instance the Abstraction permit which is paid for annually and the charges of water abstracted from the springs has to be paid for by the proponent.

6.4.6 Infrastructure development

The proposed project will result in improved road network especially along the pipeline corridor. This will be necessary to facilitate routine maintenance. Thus local community will benefit from this improved road network. Currently, the service road for Mzima I is greatly destroyed. Thus movement by motorists and pedestrians will be enhanced. Other benefits from the improved access road touch on new business opportunities.

6.4.7 Reduced conflicts among users of upstream and downstream beneficiaries.

Mzima Spring is the water supply lifeline of the project area from Tsavo to Mombasa. However, there has been disquiet among community in Taita Taveta especially Voi over the utilization of Mzima waters. Residents in Voi have felt over the years that water is in their territory but it does not benefit that much. Public consultations revealed this discontent where some residents were quoted saying "Maji yetu inapelekwa Mombasa kuosha magari" (Our water is taken to wash vehicles in Mombasa). Another Key Informant confided with the EIA Team that several times they have worked very hard to prevent demonstrations by angry residents over the Mzima I waters. Conflicts are thus inevitable. This statement is loaded with meaning. The proposed project will ensure fair and equitable distribution thus diffusing these tensions.

6.4.8 Reduced cases of water borne diseases

Constant water supply guaranteed by the proposed Mzima II imply residents will not be consuming water from contaminated sources as is the case currently. This will translate to reduced exposure to disease causing pathogens in contaminated water.

6.5 Potential Negative Impacts during Operational Phase

Completion and commissioning of Mzima II project as designed could lead to some negative impacts during its operational phase. However, these impacts will be eliminated or mitigated by employing effective mitigation measures. Certain stakeholders raised these issues during the consultations.

6.5.1 Over abstraction of water from Mzima Springs

Implementation of Mzima II pipeline will lead to abstraction of around 62% of the flows into the Springs (Atkins, 2018). Over-abstraction of water from the springs would endanger the hippos, crocodiles and fish that live in this habitat. In addition, over abstraction of water could also deny resident wildlife access to water during the dry season. As Atkins (2018) notes, high water

abstraction levels at the springs can pose a risk to downstream aquatic ecology. As such abstraction at the spring will ensure requirements for minimum environmental flow, through the ponds and also through the Mzima River. (Section 4.11.6, Above)

Mitigation measures

- It is recommended to strengthen water intake monitoring
- It is recommended to increase the quantity of rainfall stations, especially in the ridge area
- It is recommended to strengthen the discharge monitoring of Mzima Springs and other major springs that take the aquifer as the water source
- Coast Water Services Board needs to work with appropriate government agencies (including Kenya Water Towers agencies, Water Resources Authority, Kenya Wildlife Service and Kenya Forest Services) civil society organizations and local stakeholders in order to secure Mzima Springs water catchment areas.
- This should entail water catchment protection of and conservation activities including degradation of any degraded areas.
- Coast Water Services Board should work with appropriate stakeholders and develop a payment for ecosystem service scheme in which the users of water from Mzima Springs pay for the conservation and protection of the spring's water catchment.

7.0 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

7.1 Introduction

The purpose of the following Environmental Management Plan (EMP) for the proposed project is to provide mitigation measures for the significant potential negative environmental impacts. The objectives of the EMP are:

- To provide evidence of practical and achievable plans for the management of the proposed project.
- To provide the Proponent and the relevant Lead Agencies with a framework to confirm compliance with relevant laws and regulations.
- To provide community with evidence of the management of the project in an environmentally acceptable manner.

On the other hand, Environmental monitoring provides feedback about the actual environmental impacts of a project. Monitoring results help judge the success of mitigation measures in protecting the environment. They are also used to ensure compliance with environmental standards, and to facilitate any needed project design or operational changes. A monitoring program, backed up by powers to ensure corrective action when the monitoring results show it necessary, is a proven way to ensure effective implementation of mitigation measures. By tracking a project's actual impacts, monitoring reduces the environmental risks associated with that project, and allows for project modifications to be made where required.

7.2 Construction Phase Environmental Management Plan

The construction Contractor will be responsible for the implementation of the construction phase EMP. The Contractor will identify responsibilities and organization required to implement the accountabilities of the construction phase EMP. The EMP will apply to the Principal Contractor and all Sub-contractors.

The Contractor will also be responsible for developing and implementing a site specific induction for all construction workers. This induction will include all EHS hazards and their control measure. The Contractor will ensure that all construction workers are trained and competent and hold the appropriate certification for the tasks that they will be undertaking.

Table 13: Construction Phase EMP

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
1.	Water pollution	▪ Sanitation facilities shall be located within 100m from any point of work, but not closer than 50 m to any water body. ▪ All temporary/portable toilets shall be secured to the ground to prevent them toppling due to wind or any other cause. ▪ Only approved portable toilets should be used. ▪ These facilities shall be maintained in a hygienic state and serviced regularly. ▪ The contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from site to an approved disposal site. ▪ Discharge of waste from toilets into the environment and burying of waste is strictly prohibited. ▪ Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas,	CONTRACTOR	Entire construction phase

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
		which include groundwater, are not polluted. ▪ Containers of chemicals and hazardous substances used on the sites should be confined in secure holding areas before disposal to approved sites by licensed waste handlers.		
2.	Soil erosion and contamination	▪ Limit clearance of vegetation only on the way leave as much as possible to minimize exposure of soil to agents of erosion. ▪ Put up barriers to protect soil from erosion along the pipeline route where there are steep edges. ▪ Service machines, vehicles and heavy equipment to ensure there is no spillage of oil and greases during operations. ▪ Labelling all hazardous substances and providing work instructions in their use.	Contractor	Entire construction phase
3.	Noise and vibrations	▪ Prevent exposure of construction workers to	Contractor	Entire construction phase

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
		unacceptable noise levels. ▪ Minimize construction through night time whenever possible. ▪ PPE for workers operating machines that are generating noise and vibrations that can be injurious to their health. ▪ Limit construction to day time only unless with special permission. ▪ Proper maintenance of motor vehicles and other machines. ▪ Install silences in heavy equipment. ▪ Use manual excavation where possible.		
4.	Death of wild animals through accidents such as falling in open trenches or being hit by speeding construction vehicles	▪ Driving within the permitted speed limit in the protected areas such as Tsavo national park to avoid road kills. ▪ Limiting the time trenches remain open in the park to maximum 24 hours and a length of not more than 200 metres each day. ▪ Strict observance of Park Rules and Regulations. ▪ Embedding KWS personnel to the	▪ Contractor. ▪ KWS. ▪ Security Agencies	Preconstruction and Construction phase

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
		Resident Engineer's (RE) Office to ensure that the Contractor does not operate in any way that is prejudicial to conservation of flora and fauna in Tsavo East and West.		
5.	Upsurge of illegal activities in the protected Tsavo National Park	▪ Inspection of all construction vehicles entering and or leaving the protected areas of Tsavo National park. ▪ Creating a manned entry near for example at Ndii where the pipeline exits Tsavo West. The same case should apply for Tsavo East. ▪ Embedding KWS personnel to the Resident Engineer's (RE) Office to ensure that the Contractor does not operate in any way that is prejudicial to conservation of flora and fauna in Tsavo East and West. ▪ Strict observance of Park Rules and Regulations. ▪ Vetting all workers who will work in the park sections of the pipeline. This will ensure that only people	▪ Contractor. ▪ KWS ▪ Security Agencies	▪ Preconstruction. ▪ Construction.

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
		with no criminal records are allowed in the park.		
6.	Disturbance of wild animals distribution and ranging patterns	▪ Maintenance of machines so as to reduce noise during operations. ▪ Strict enforcement of speed limits in the park. ▪ Use of silencers in heavy noisy machines. ▪ Have optimal construction workers in the park. ▪ No construction camps in the parks.	Contractor	Construction phase
7.	Introduction of alien and invasive species in Tsavo national park by vehicles and heavy machines	▪ Cleaning all machinery before entering the protected area to ensure they are free from seeds or other material that may introduce invasive species.	Contractor	Entire construction phase.
8.	Habitat loss, degradation and fragmentation	▪ Restrict to land –take to the Mzima I right of way, restore cleared areas as soon as the pipes are installed ▪ Landscaping to minimize soil erosion. ▪ Control earthworks in ecologically sensitive areas need to be controlled and should not be carried out in	▪ Contractor. ▪ Proponent	Construction phase

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
		ecologically sensitive areas including steep hillsides and water sources. ▪ Habitat restoration measures including leveling and replanting and should be made mandatory ▪ Formulate Payment for Ecosystem Services where water uses will pay for the conservation of Mzima springs water catchment		
9.	Potential for human wildlife conflicts – the risk of death or injury among workers	▪ Reducing the human footprint associated water pipeline will be limited through controlling the number of workers allowed project site during the implementation, operation and decommissioning phases. ▪ At the beginning of the project, the workers will need to be briefed on the dangers they will be exposed to while working in wildlife habitats. They will be educated on how best to behave and protect	▪ Contractor	Construction phase

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
		themselves from dangerous animals. ▪ The workers will need to be accompanied by armed KWS rangers while working in the parks and other wildlife rich habitats.		
10.	Interference with tourism activities	▪ Most of the work should be timed to coincide with low tourism season/time of day.	▪ Contractor.	Construction phase
11.	Death or injury due to construction accidents	▪ Provision of appropriate working tools such as climbing ropes, safety shoes and helmets ▪ Display at prominent places occupational health and safety rules. ▪ Test and approve equipment such as ladders before use. ▪ Training workers on how to use various PPE and proper use of machinery. ▪ Routine maintenance of machinery. ▪ Right machine for right work. ▪ Enforcing a strict alcohol and drugs policy in the project cycle.	Contractor	Entire construction phase

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
		▪ Engaging only competent personnel to handle machinery. ▪ Appropriate informational and warning signs. ▪ Compulsory training on safety precautions to be observed while working in national parks. ▪ Contractor to get security from Kenya Wildlife Service (KWS) for workers at all time while there are project activities within the parks. ▪ Project activities within the Parks to be carried out only during the permitted hours unless the Contractor has a special undertaking for which permission form KWS has been asked and granted. ▪ Have trained First Aiders and well stocked First Aid boxes at accessible locations in the proposed project.		
12.	Death or injury of workers from attacks by dangerous animals	▪ Training of workers on how to conduct themselves in the parks. ▪ Working only during the day.	▪ KWS. ▪ Contractor	

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
		▪ Have armed KWS rangers always accompanying workers in the park.		
13.	Disturbance of traffic and difficulty of access	▪ Traffic department should approve crossing plan prior to construction, and should approve obstruction times during construction. ▪ Access of residents should be facilitated by installing appropriate temporary bridges over the pipeline trenches. ▪ Suitable warning signs should be placed at near locations and should be visible at night. ▪ A guard should be available 24 hours to help people access across pipeline trenches. ▪ Alternatives access ways should be communicated to the community ▪ Provide Marshalls to assist the elderly, school children, expectant mothers and Persons With Disability (PWDs) cross the trenches.	▪ Contractor. ▪ Traffic Department	Construction phase

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
14.	Damage of underground infrastructure	▪ Collecting available maps for infrastructure routes. ▪ Excavating manual trial pits to locate the underground infrastructure facilities before using mechanical excavation. ▪ Design of the proposed Mzima II be shared with KPLC, KPC, KENHA, KERA, and all companies such as Safaricom that have laid their fibre optic cables in the project area.	Contractor	Construction phase
15.	Structural integrity	▪ The geotechnical report should include suitable measures for confining vibrations within project sites. These measures should be tailored according to the proximity of buildings to the project sites and earthwork program. ▪ These recommendations identified in the geotechnical report (such as secant piling or sheet piling or establish cut-off walls) should be implemented by the contractor and	Contractor	Entire Construction phase

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
		supervised by Environment Health and Safety Advisor. ▪ No blasting should take place while excavating in built up areas ▪ Use manual excavation in areas that have vulnerable structures.		
16.	Chemical exposure	▪ Material safety data sheets of all chemicals used during construction will be kept in a register by the contractor ▪ The contractor to have procedures in place regarding emergencies relating to chemicals and dangerous goods consistent with the existing legislation. ▪ Records will be kept on the existing inventory, storage location, personnel training and disposal of waste for all chemicals and dangerous goods used on site ▪ All relevant construction workers will be trained in appropriate handling, storage and containment practices for chemicals and dangerous goods in	Contractor	Construction phase

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
		relation to their position. ▪ All spills will be cleaned immediately		
17.	Liquid Effluents from Contractor's camps	▪ Provision shall be made for employee facilities including shelter, toilets and washing facilities. ▪ Toilet facilities supplied by the contractor for the workers shall occur at a minimum ratio of 1 toilet per 30 workers (preferred 1:15). ▪ The exact location of the toilets shall be approved by the Public Health Department prior to establishment. ▪ Sanitation facilities shall be located within 100m from any point of work, but not closer than 50 m to any water body. ▪ All temporary/portable toilets shall be secured to the ground to prevent them toppling due to wind or any other cause. ▪ The contractor shall ensure that the entrances to toilets are adequately screened from public view.	Contractor	Construction phase

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
		▪ Only approved portable toilets should be used. ▪ These facilities shall be maintained in a hygienic state and serviced regularly. Toilet paper shall be provided ▪ The contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from site to an approved disposal site. ▪ Discharge of waste from toilets into the environment and burying of waste is strictly prohibited. ▪ Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas, which include groundwater, are not polluted.		
18.	Solid wastes	Employ the integrated solid waste management system i.e. through a hierarchy of options: ▪ Source reduction ▪ Recycling	Contractor	Construction phase

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
		▪ Composting and reuse ▪ The contractor should segregate hazardous waste, which will be safely transported to a hazardous waste facility, from non-hazardous waste which will be transported to approved disposal sites by NEMA. ▪ Garbage collected from construction sites should be disposed at appropriate sites approved by NEMA. ▪ Inert construction wastes should be appropriately collected and disposed in approved disposal site. ▪ Sell metal to authorized scrap metal dealers ▪ Wastes recovery		
19.	Population displacement with attendant loss of income and property	▪ Compensation at full replacement cost for losses of assets attributable directly to the project. ▪ Prepare a Resettlement Action Pan (RAP) for	Proponent and contractor	Entire Preconstruction and construction phases

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
		the proposed project with: i. A comprehensive census of Project Affected Persons (PAPs). ii. Asset Inventory of the PAPs. iii. Cutoff dates that are reasonable. iv. Compensation rates, procedure and Schedule v. Grievance Redress Mechanisms. vi. Proponent to properly survey and map the way leave vii. Lay the pipeline within the existing way leave. viii. Avoid encroachment on private property.		
20.	Fire outbreak	▪ Label all inflammable materials and sore them appropriately ▪ Provision of adequate firefighting equipment capable of fighting all classes of fire ▪ Put " No Smoking Signs" in areas where inflammables are stored	Contractor	Construction phase

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
		▪ Train workers on the use of firefighting equipment ▪ Label fire exits and keep them clear in the Contractor's camp. ▪ Display a list of emergency contact numbers prominently		
21.	HIV/AIDS	▪ Sensitize the migrant workers and host community on risky sexual behaviour. ▪ Have VCT services on site and encourage workers to undergo the same. ▪ Provision of protective devices such as condoms. ▪ Ensure project is completed within the set timeframe to minimize the contact. ▪ Provide counseling and testing for HIV/AIDS to ▪ incoming construction personnel ▪ Strengthen advocacy through awareness training in HIV/AIDS and other STDs;	Contractor	Construction phase

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE ACTOR	TIMEFRAME
		▪ Encourage the use of preventive measures like ▪ condoms by availing condom dispensers to construction staff.		
22.	Socio-cultural conflicts	▪ Sensitize migrant workers on key cultural sensitivities of the host community. ▪ Ensure fairness in recruitment of workforce by ensuring that local people get priority of the jobs that they can perform. ▪ Create open communication for people to channel their grievances to avoid rumours and fake news with respect to the proposed project. ▪ Engage with local leaders at all times. ▪ Create a project committee with representation of all actors.	▪ Contractor. ▪ Proponent	Construction phase

7.3 Operation phase Environmental Management Plan

The responsibility of the implementing operation phase EMP will be shared between the Contractor and the Proponent. The Contractor will be responsible for any impacts that might happen during the Defect Liability Period (DLP). Conversely, the Proponent will be responsible for the entire operations and maintenance of the pipeline upon the expiry of the DLP and complete handing over of the project from the Contractor.

Table 14 : Operation Phase EMP

SN	IMPACT	MITIGATION MEASURES	RESPONSIBLE PARTY	TIMEFRAME
1.	Risk of over abstraction of water from Mzima Springs	▪ It is recommended to strengthen water intake monitoring by installing a Master Meter ▪ It is recommended to increase the quantity of rainfall stations, especially in the ridge area ▪ It is recommended to strengthen the discharge monitoring of Mzima Springs and other major springs that take the aquifer as the water source	▪ Proponent. ▪ WRA.	Throughout operation
2.	Catchment changes affecting Chyulu aquifer and spring flow	▪ Coast Water Services Board needs to work with appropriate government agencies (including Kenya Water Towers agencies, Water Resources Authority, Kenya Wildlife Service and Kenya Forest Service) civil society organizations and local stakeholders in order to secure Mzima Springs water catchment areas. ▪ This should entail water catchment protection of and conservation activities including degradation of any degraded areas. ▪ Coast Water Services Board should work with appropriate stakeholders and develop a payment for ecosystem service scheme in which the users of water from Mzima Springs pay for the conservation and protection of the spring's water catchment	▪ Proponent. ▪ WRA.	Throughout operation

3.	Risk of pipe burst	▪ Monitoring water flow to detect leaks. ▪ Effective operation and maintenance of the pipeline.	▪ Proponent. ▪ WRA.	Operation phase
4.	Shortage of water for wild animals	▪ Construct water troughs for wild animals.	▪ Proponent ▪ Contractor.	Operation phase

7.4 Decommissioning Phase Environmental Management Plan

At the end of its design life, the proposed Mzima II project will undergo decommissioning. This can take two forms:

i. Abandoning the pipeline.
ii. Removing the pipeline from the ground and restoring the area.

In case of the first option, there will be minimal damage and disturbance to the environment. However, if the Proponent opts for the second option, the impacts will be far reaching. Apparently, these impacts compare favourably to the impacts in the Construction Phase. Thus similar mitigations to those of construction phase will apply (Table 13, above). The responsibility of the implementing decommissioning phase EMP will be shared between the Contractor and the Proponent.

8.0 CONCLUSION AND RECOMMENDATION

8.1 Conclusion

Implementation of the proposed Mzima II water pipeline project deserves unqualified support. To say that the project is long overdue is an understatement. This socially and economically uplifting undertaking is worth all the effort and resources. It will mean radical positive transformation to lives of millions who are alive now and generations after them in the project area.

The importance of the proposed project at the county and national government levels cannot be overemphasized. In addition to following the laid down guidelines, project design has also factored in state of art technology in line with sound environmental management practices.

Having considered the information collected, collated and analysed during the study, it is the Experts considered opinion that:

i. The potential significant negative impacts identified will be effectively mitigated by implementing the proposed measures.
ii. The positive environmental impacts far outweigh the negative ones, which shall be contained by following the prescribed EMP.
iii. The proposed project will not compromise the well-being of the community, ecology or any other conditions.
iv. The project should be allowed to commence and activities managed within the provided EMP.
v. The proponents have taken all due care in relation to laws and procedures of the country in setting up of the project. Construction contractor shall implement the construction phase by strictly following the proposed mitigation measures.
vi. It will contribute to the economic growth of the area in numerous ways. The injection of close to 20 Billion shillings in the county is a big boost for the economy of the area.

8.2 Recommendations

- The proponent should be given all the available support to implement this noble project.
- The licensing authorities should issue the necessary licenses so that the work can commence immediately.

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Appendix 1: Institutional stakeholders consulted.

S/N	NAME	ORGANIZATION	DESIGNATION	DATE
1.	Joseph Mutile	Voi Sub-County	Deputy County Commissioner	
2.	Joyce Koech	Kasemeni Division	Assistant County Commissioner	03/05/2018
3.	Board of Directors	TAVEVO		04/05/2018
4.	Joyce Njagi	Nyangala Division	Assistant County Commissioner	
5.	Kenneth Akwiri	Tausa Division	Assistant County Commissioner	
6.	Drussila Ngele	Maungu Division	Assistant County Commissioner	08/05/2018
7.	Martin Mwaro	Kwale County	County Secretary	02/05/2018
8.	Joseph Ngumo Karaku	Kwale County	County Commissioner	02/05/2018
9.	Willie Mwadilu	Kenya Association of Hotel Keepers	Chairman	04/05/2018
10.	Athman Gunda	Kwale Water and Sewerage Company	Managing Director	07/05/2018
11.	Musyoki M. Muthoka	Water Services, Roads and Public Works	Chief Officer	07/05/2018
12.	Benson. K. Kokoi	Kasemeni	Chief	30/04/2018
13.	Samson Chale Joho	Mwatate	Chief	30/04/2018
14.	Solomon Dalu	Mwavumbo	Chief	30/04/2018
15.	Suleiman Mundu	Samburu	Chief	30/04/2018
16.	Raphael Mwachilungo	Taru	Chief	30/04/2018
17.	Mumo Ndana	Mackinon Road	Chief	30/04/2018
18.	Peter Rangi	Maungu	Chief	08/05/2018
19.	Abel Mwangemi	Voi	Chief	08/05/2018
20.	Eliud Mbogho Majani	Mbololo	Chief	08/05/2018
21.	Ezekiel Malombo	Ngolia	Chief	08/05/2018
22.	Wario Kuta	CWSB	Supervisor, Mzima Pipeline	Throughout the study
23.	Wilson Njue	Tsavo East National Park	Deputy Senior Warden	09/05/2018
24.	Fredrick Lala	Tsavo East National Park	Senior Research Scientist	09/05/2018
25.	David Kimtai	Tsavo East National Park	Research Scientist	09/05/2018
26.	Captain Kenneth Ochieng	Senior Warden	Tsavo West	11/5/2018
27.	Bernard Ochieng	Scientist	Tsavo West	11/5/2018

S/N	NAME	ORGANIZATION	DESIGNATION	DATE
28.	Eng. Mwagazi Mwamrizi	Deputy Resident Engineer	Galana Kulalu Irrigation	Email
29.	Angela Sheldrick	David Sheldrick Wildlife Trust	Chief Executive Officer,	Email
30.	Kenneth Kimtai	African Wildlife Foundation	Landscape Ecologist	Email
31.	Dr Ben Okita	Save the Elephant	Head of Research	Email
32.	Dr Mwangi Githiru	Wildlife Works	Scientist	Email
33.	Eng David Ochiere	Galana Kulalu Food Security Project	Senior Resident Engineer	Email
34.	Walter Nyatwanga	Senior Environmentalist	KENHA	Phone Interview
35.	Faith Marekia	Area Program Head	World Vision, Mwatate	10/5/2018
36.	Mwarigha Benson	Project Officer	Kenya Red Cross Voi	10/5/2018

Appendix 2: Lists of community members consulted along the pipeline corridor.

Appendix 3: Minutes of Kasemeni Consultation meetings

MINUTES OF PUBLIC STAKEHOLDER MEETING HELD ON 3rd May 2018 FROM 1100 HRS AT CHIEF'S OFFICE COMPOUND

KASEMENI LOCATION

PRESENT: All members who attended the meeting are annexed to this minutes.

he meeting was called to order by the area chief at 11:00am and prayers were conducted by Benson Katana Kokoi.

Minute	Deliberation
1.	**Introduction of Consultant's Team**
2.	The area chief introduced the stakeholders and the consultant team that was present and gave a short brief of the purpose of the meeting.
	Opening Remarks
	Elijah Kimani gave opening remarks on the project and requested questions to be directed to the consultant members present. He also emphasized on the importance of community participation and encouraged the participants to be free and open as their input was very valuable.
	He outlined that Mzima II Springs Pipeline ESIA and RAP was awarded to Francis Allen Consulting Ltd by Coast Water Service Board (CWSB) and financed by EXIM Bank.
	Presentation of the proposed project to the stakeholders
3.	Joy Wasirimba emphasized on the role of NEMA and the importance of Environmental and Social Impact Assessment (ESIA) on all projects so as to cushion the community against environmental degradation during pipeline construction
	She then encouraged the participants to give their comments, opinions and views on the proposed works.
4.	**Question & Answer session**
	Q1: Edward Chigumba *asked* if the pipeline will follow the same course/ route as the previous pipeline
	A: Mr. Wairo from CWSB explained that pipeline will follow the same course/ route as the previous pipeline
	Q2: Edward *Mangale asked why the same project is still being discussed since the same issues were raised 3 to 4 yrs. ago. What has changed*
	A: Elijah Kimani explained that there were some technical Design reviews prior to the construction phase. The other reason was the Government was looking for financiers so as to move to construction stage
	Q3: Riziki Katana *asked if the current water tanks will be used or rehabilitated since they are in bad state*
	A: Mr. Wairo from CWSB explained that the existing tanks were truly in bad stated in case they are to be used then tank repairs and replacement will be necessary
	Q4: Samson Katana asked if the access road along the old pipeline would be repaired or upgraded
	A: Hiram Gacinah stated that the contractor has already factor in the rehabilitation or upgrade cost in the construction cost
	Q5: George Demo (Mazera's) asked if the access road would be maintained after the upgrade and how effective will this road be towards
	A: Hiram Gacinah stated that the road will be maintained regularly since it will provide access to the pipeline during routine maintenance exercises
	Q6: Stanley Matano asked how long will the project take taking in account construction and commissioning

Appendix 4: Minutes of Mwavumbo (Kalalani) Consultation meetings

CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE

MINUTES OF COMMUNITY PUBLIC PARTICIPATION MEETING HELD ON 03RD MAY 2018 FROM 11:00 HRS AT KALALANI CHIEF'S CAMP.

Coordinates: S 3° 50' 57.048" E 39° 27' 15.304

PRESENT: All members who attended the meeting are annexed to this minutes.

The meeting was called to order by the area chief at 11:00am and prayers were conducted by Pascal Changoti.

Minute	Deliberation
1.	**Introduction of Consultant's Team** The area chief introduced the stakeholders and the consultant team that was present and gave a short brief of the purpose of the meeting. The ward administrator Mr.Mwanjole introduced the community representation of villages along the pipeline in the meeting as follows. Mbirikani village:2, Mwabila B:9,Chingobero B:2, Mwabila A:1,Mlola B:4, Mwanda B:7, Mwanda A: 7, Mwavumbo B:6, Kavingo:2, Mgandi: 16.
2.	**Opening Remarks** Stephen Chege gave opening remarks on the project and requested questions to be directed to the consultant members present. He also emphasized on the importance of community participation and encouraged the participants to be free and open as their input was very valuable. He further outlined that the mandate of Coast Water Services Board (CWSB) and the importance of the construction of Mzima 2 as it will supplement water supplied by Mzima 1. He further stated the importance of an EIA assessment on all projects affecting the community. He stated that there will also be an Environmental Social Impact Assessment (ESIA) as well as Resettlement Action Plan (RAP) detailing the process of persons and asset assessment to be affected by the project. He concluded by stating that CWSB aims at creating a win-win scenario.
3.	**Presentation of the proposed project to the stakeholders**

4.	Engineer Fredrick Mureithi introduced the Mzima 2 project to the community whose source is Chyulu hills in Tsavo East national park and would be 220 km long. Its design volume is 105,000m³ with a diameter of 4ft. The way leave would be 30m from end to end as there was need for some way to enable construction and maintenance. He stated that the pipeline would be adjacent to the Mzima 1 pipeline with better construction materials to withstand weather, soil as well as time. He stated that it was expected that this water project would be able to service the coast region water demands up to 2035. Ms. Victoria Mumbi introduced the RAP process and stated that the project was following the World Bank guidelines in regard to compensation which states that any project was supposed to leave the locals even better than they were before financially and cause the most minimal disturbance to them. There would be census taking place as well as asset inventory of persons and properties along the pipeline corridor. She further stated that those PAPs would be compensated on their development and given between 90days to 3months to relocate. She further stated that no affected person would be left behind as all will be documented. She then encouraged the participants to give their comments, opinions and views on the proposed works. **Question & Answer session** ***Q1:*** *Pascal Changoti from Mwavumbo B asked if a person had two parcels of land does one write their name on one and their spouse on the other.* **A:** Victoria Mumbi answered this question and stated that the Mzima 2 project does not intend to make any new land acquisitions and hence just the way leave that was commissioned for the Mzima 1 which was 30m from end to end would be utilized for construction and maintenance. ***Q2:*** *Stephen Kubado asked what would happen in the cases of graves, fruit trees and crops* **A:** Those whose properties will be affected by the construction will be fully compensated if their development on the pipeline corridor. Crops will be assessed just before construction and full amount of harvest will be paid. If there would be dumping of soil at someone's property, then a disturbance fee of 15% would be paid. ***Q3:*** *Ramadhan Mwang'ombe asked if there would be a local committee in the project implementation to oversee the interests of the community.*

4.	Engineer Fredrick Mureithi introduced the Mzima 2 project to the community whose source is Chyulu hills in Tsavo East national park and would be 220 km long. Its design volume is 105,000m³ with a diameter of 4ft. The way leave would be 30m from end to end as there was need for some way to enable construction and maintenance. He stated that the pipeline would be adjacent to the Mzima 1 pipeline with better construction materials to withstand weather, soil as well as time. He stated that it was expected that this water project would be able to service the coast region water demands up to 2035. Ms. Victoria Mumbi introduced the RAP process and stated that the project was following the World Bank guidelines in regard to compensation which states that any project was supposed to leave the locals even better than they were before financially and cause the most minimal disturbance to them. There would be census taking place as well as asset inventory of persons and properties along the pipeline corridor. She further stated that those PAPs would be compensated on their development and given between 90days to 3months to relocate. She further stated that no affected person would be left behind as all will be documented. She then encouraged the participants to give their comments, opinions and views on the proposed works. **Question & Answer session** ***Q1:*** *Pascal Changoti from Mwavumbo B asked if a person had two parcels of land does one write their name on one and their spouse on the other.* **A:** Victoria Mumbi answered this question and stated that the Mzima 2 project does not intend to make any new land acquisitions and hence just the way leave that was commissioned for the Mzima 1 which was 30m from end to end would be utilized for construction and maintenance. ***Q2:*** *Stephen Kubado asked what would happen in the cases of graves, fruit trees and crops* **A:** Those whose properties will be affected by the construction will be fully compensated if their development on the pipeline corridor. Crops will be assessed just before construction and full amount of harvest will be paid. If there would be dumping of soil at someone's property, then a disturbance fee of 15% would be paid. ***Q3:*** *Ramadhan Mwang'ombe asked if there would be a local committee in the project implementation to oversee the interests of the community.*

Appendix 5: Minutes of Mwatate Consultation meetings

MINUTES OF PUBLIC STAKEHOLDER MEETING HELD ON 3rd May 2018 FROM 1255 HRS AT CHIEF'S OFFICE COMPOUND

MWATATE LOCATION

PRESENT: All members who attended the meeting are annexed to this minutes.

Minute	Deliberation
1.	Introduction of Consultant's Team
2.	The area chief Chale Joho Samson introduced the stakeholders and the consultant team that was present and gave a brief of the purpose of the meeting. And highlighted few SGR, KETRACO, Nairobi-Mombasa express way and Mzima II Springs **Opening Remarks** Elijah Kimani gave opening remarks on the project and requested questions to be directed to the consultant members present. He also emphasized on the importance of community participation and encouraged the participants to be free and open as their input was very valuable. He outlined that Mzima II Springs Pipeline ESIA and RAP was awarded to Francis Allen Consulting Ltd by Coast Water Service Board (CWSB) and financed by EXIM Bank.
3.	**Presentation of the proposed project to the stakeholders** Joy Wasirimba emphasized on the role of NEMA and the importance of Environmental and Social Impact Assessment (ESIA) on all projects so as to cushion the community against environmental degradation during pipeline construction She then encouraged the participants to give their comments, opinions and views on the proposed works.
4.	**Question & Answer session** Q1: Kombo Henzano (Mdumo Village) *asked How many meters is the wayleave/ reserve area for mzima pipeline* A: Mr. Wairo from CWSB explained that pipeline parallel to the previous pipeline and will have 30 m wayleave along it length Comment: Chief Chale Joho Samson concluded by asking people to to appreciate all the projects mentioned earlier in his address and asked the attendees to cooperate and support the government as its works to deliver this projects **There was no AOB.** The meeting adjourned at 1:30pm with a word of prayer from the Pst. Ndao

SAMSON CHALE JOHO

CHIEF
MWATATE LOCATION

Appendix 6: Minutes of Samburu Consultation meetings

CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE

MINUTES OF COMMUNITY PUBLIC PARTICIPATION MEETING HELD ON 03RD MAY 2018 FROM 12:00 HRS AT SAMBURU MATOPE CHIEF'S CAMP

Coordinates: S 3° 47' 45.393" E 39° 5' 42.881"

PRESENT: All members who attended the meeting are annexed to this minutes.

The meeting was called to order by the area chief at 11:00am and prayers were conducted by Charles Chabebo.

Minute	Deliberation
1.	**Introduction of Consultant's Team** The area chief Mr. Suleiman Mundu introduced the stakeholders and the consultant team that was present and gave a short brief of the purpose of the meeting. The assistant chief introduced the various representations of the villages in the Samburu locations and where the Mzima 1 springs passes. He further encouraged all participants to be free as this was an important stage of the implementation of the project.
2.	**Opening Remarks** Stephen Chege gave opening remarks on the project and requested questions to be directed to the consultant members present. He also emphasized on the importance of community participation and encouraged the participants to be free and open as their input was very valuable. He further outlined that the mandate of Coast Water Services Board (CWSB) and the importance of the construction of Mzima 2 as it will supplement water supplied by Mzima 1. He further stated the importance of an EIA assessment on all projects affecting the community. He stated that there will also be an Environmental Social Impact Assessment (ESIA) as well as Resettlement Action Plan (RAP) detailing the process of persons and asset assessment to be affected by the project. He concluded by stating that CWSB aims at creating a win-win scenario.
3.	**Presentation of the proposed project to the stakeholders**

	Engineer Fredrick Mureithi introduced the Mzima 2 project to the community whose source is Chyulu hills in Tsavo East national park and would be 220 km long. Its design volume is 105,000m³ with a diameter of 4ft. The way leave would be 30m from end to end as there was need for some way to enable construction and maintenance. He stated that the pipeline would be adjacent to the Mzima 1 pipeline with better construction materials to withstand weather, soil as well as time. He stated that it was expected that this water project would be able to service the coast region water demands up to 2035. Ms. Victoria Mumbi introduced the RAP process and stated that the project was following the World Bank guidelines in regard to compensation which states that any project was supposed to leave the locals even better than they were before financially and cause the most minimal disturbance to them. There would be census taking place as well as asset inventory of persons and properties along the pipeline corridor. She further stated that those PAPs would be compensated on their development and given between 90days to 3months to relocate. She further stated that no affected person would be left behind as all will be documented.
4.	**Question & Answer session** **Q1:** *Julo Ngao from Ngomani village A asked where the new pipeline would be and if it will cross the road at any point.* **A:** Fredrick Mureithi responded and said that the new Mzima 2 pipeline will be adjacent to the old one and will follow the way leave that had been set aside. It will not pass anywhere new. **Q2:** *Mukuta Ngao asked if there would be compensation of property damaged* **A:** Victoria Mumbi stated that those whose properties will be affected by the construction will be fully compensated and those on the pipeline corridor will be given enough notice of 90 days to 6 months for them to move and salvage their property. Proof of ownership of land will be key for compensation and the valuation will be done with current market rates. **Q3:***Josephat Tsuma asked if there are people on the other side of the pipe would be affected* **A:**Fredrick Mureithi stated that where the old Mzima 1 way leave was, the new pipeline would be placed with a corridor width of 30m from end to end or 15m from the center of

	the pipe on both the left and the right sides which would mean persons on both sides of the pipe would be affected. ***Q4:****Francis Ngazi Marondo asked if plots and crops would be compensated* **A:** Victoria Mumbi responded and said that there would be no new land acquisitions as the wayleave of the past pipeline remains in the new project. Any damage on crops would be assessed and compensated.
5	**There was no AOB.** The meeting adjourned at 02:00pm with a word of prayer from the chief representative.

Minutes confirmed and signed off by;

Confirmed by **Date 11/05/2018**

SNR. CHIEF MUNDU
SAMBURU LOCATION

....

Signed off by **Date 11/05/2018**

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Appendix 7: Minutes of Taru Consultation meetings

MINUTES OF PUBLIC STAKEHOLDER MEETING HELD ON 3rd May 2018 FROM 1500 HRS AT CHIEF'S OFFICE COMPOUND

TAKU LOCATION

PRESENT: All members who attended the meeting are annexed to this minutes.

Minute	Deliberation
1.	**Introduction of Consultant's Team**
2.	The area chief Raphael Mwachilungo introduced the stakeholders and the consultant team that was present and gave a short brief of the purpose of the meeting.
	Opening Remarks
	Joy Wasirimba gave opening remarks on the project and requested questions to be directed to the consultant members present. She also emphasized on the importance of community participation and encouraged the participants to be free and open as their input was very valuable.
	She outlined that Mzima II Springs Pipeline ESIA and RAP was awarded to Francis Allen Consulting Ltd by Coast Water Service Board (CWSB) and financed by EXIM Bank.
3.	**Presentation of the proposed project to the stakeholders**
	Elijah Kimani emphasized on the role of NEMA and the importance of Environmental and Social Impact Assessment (ESIA) on all projects so as to cushion the community against environmental degradation during pipeline construction
	He then encouraged the participants to give their comments, opinions and views on the proposed works.
4.	**Question & Answer session**
	Q1: Peter Kiwali *asked How wide is the wayleave / reserve provided for the Mzima pipeline project*
	A: Mr. Wairo from CWSB explained that pipeline wayleave is about 30m wide as it were established during the construction of Mzima I pipeline
	Q2: Salim Chakaya *asked if the Mzima II pipeline lies within the 30m wayleave as provided by Mzima I pipeline*
	A: Elijah Kimani explained that the existing 30m wayleave provided was sufficient for the construction for the new construction of Mzima II pipeline
	Q3: Bonface Mwatele *asked why there were different people will be paid differently*
	A Joy Wasirimba explained that the *compensation rates vary with the nature of property value as well as structures on the land of interest*
	Q4: Ganza Mvumba asked what will happen to the land owners who feel like the value for their assets was not properly evaluated
	A: Joy Wasirimba stated that the land valuers will have to reassess or advice accordingly on the issues and conduct a re-evaluation exercise where need arises
	Q5: Patrick Joho Ndegwa asked if the new pipeline is within the wayleave provided from the previous reserve area and was concerned if there would be a mix up in the setting up of the pipeline
	A: Hiram Gacinah explained that the surveyors will work hand with the relevant Authorities to ensure the setting up of the new pipeline follows the design as much as possible
	Q6: Zainab Nzabe asked if in case of a section of a house/building is found to be outside the said wayleave will it be compensated in full
	A: Joy Wasirimba stated that in such case this will be treated as land acquisition whereby the land plus the house will be compensated in full
	Q7: Rumba Nyamawe asked whether the was money allocated for sitting allowance for the stakeholders who attended the meetings

	A: Joy Wasirimba stated that the public barazas were meant to sensitize the locals on the benefits derived from the projects and no payment was to be made towards this Q8: Rumba Nyamawe asked what will happen to the destruction of the environment caused during construction A: Joy Wasirimba stated that the mitigation measures will be handled in full under EMPP There was no AOB. The meeting adjourned at 4:30pm with a word of prayer from the Maalim

Sign.

CHIEF
TARU LOCATION

Raphael Rumo Mwachilungo

Appendix 8: Minutes of Voi Consultation meetings

CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE

MINUTES OF COMMUNITY PUBLIC PARTICIPATION MEETING HELD ON 08th MAY 2018 FROM 11:00 HRS AT SOFIA BONA HALL

Coordinates: S 3° 23' 14.121" E 38° 34' 40.496"

PRESENT: All members who attended the meeting are annexed to this minutes.

The meeting was called to order by the area chief at 11:00am and prayers were conducted by Festus Mzee.

Minute	Deliberation
1.	**Introduction of Consultant's Team** The chief Mr.Abel Mwangemi called the meeting to order and introduced the stakeholders and the consultant team that was present and gave a short brief of the purpose of the meeting and highlighted his expectations in regard to the Mzima 2 project who stated that Voi town community were the worst hit with shortages of water and they welcomed the project as it would supplement their water.
2.	**Opening Remarks** Dr. Stephen Chege introduced the project and requested questions to be directed to the consultant members present. He also emphasized on the importance of community participation and encouraged the participants to be free and open as their input was very valuable. He further outlined that the mandate of Coast Water Services Board (CWSB) and the importance of the construction of Mzima 2 as it will supplement water supplied by Mzima 1. He further stated the importance of an EIA assessment on all projects affecting the community. He stated that there will also be an Environmental Social Impact Assessment (ESIA) as well as Resettlement Action Plan (RAP) detailing the process of persons and asset assessment to be affected by the project. He concluded by stating that CWSB aims at creating a win-win scenario.
3.	**Presentation of the proposed project to the stakeholders**

	Engineer Fredrick Mureithi introduced the Mzima 2 project to the community whose source is Chyulu hills in Tsavo East national park and would be 220 km long. Its design volume is 105,000m³ with a diameter of 4ft. The way leave would be 30m from end to end as there was need for some way to enable construction and maintenance. He stated that the pipeline would be adjacent to the Mzima 1 pipeline with better construction materials to withstand weather, soil as well as time. He stated that it was expected that this water project would be able to service the coast region water demands up to 2035. Ms. Victoria Mumbi introduced the RAP process and stated that the project was following the World Bank guidelines in regard to compensation which states that any project was supposed to leave the locals even better than they were before financially and cause the most minimal disturbance to them. There would be census taking place as well as asset inventory of persons and properties along the pipeline corridor. She further stated that those PAPs would be compensated on their development and given between 90days to 3months to relocate. She further stated that no affected person would be left behind as all will be documented.
4.	**Presentation by Tavevo Water and sewerage company and other formal stakeholders.** The chief introduced the Taita Taveta county governor representative Mr. Stanley Maigacho who welcomed the Mzima 2 project as one of the key visionary delivery proposals spearheaded by the governor and proposed that the project designers should ensure that the water needs of the county are met as demand is growing amidst low water supply. He further added that the consultants should make sure that their true sentiments are put down in the report. He also added that the contractor should involve the locals in implementing the resettlement policy as well as equal distribution of the available job opportunities. The chief then introduced the Taita Taveta county government service delivery unit representative Eng. Stephen Mwadima who also welcomed the project and stated that the county deserves to be put as a first priority in receiving the water adequately before distribution to other counties. He also added that his office will closely monitor the implementation of the project. He also suggested that all job opportunities within the boundaries of Taita Taveta County should be given to the locals. The chief then introduced the Ministry of water and irrigation CEC and COO representative Mr. Peter Kofia and outlined that the Mzima 2 sprins project was aimed at giving priority at

	supplying water for domestic, livestock and industrial use. He added that projects of supplying water for irrigation were being planned by the county and national government institutions. The chief then invited the Tavevo Water and sewerage company board chairman Mr. Costa Malai who introduced himself as well as other board members who has accompanied him as follows: 1) Dr. Jimmy Kihara-Director, human resource head at Tavevo. 2) Mohammed Ali-Director, Financial audit head at Tavevo. 3) Edward Mwaburi- SCOO, Min of water and irrigation, Voi. He outlined the role of Tavevo as the body involved in the distribution of water as well as putting up local water connections to the local community. He stated that the new Tavevo board was in office for only 54 days and that they had taken note of the many issues regarding distribution and billing and were working to solving it. He stated that they had put up zonal offices to build close working relationships with the community.
5.	**Question & Answer session** **Q1:** *Raphael Ngau from gimba asked whether compensation would be done if one had title deed or not.* **A:** Victoria Mumbi stated that the Mzima 2 pipeline has already been allocated a wayleave of 30m and hence this was the land to be used during the construction. The project would only compensate the development of the land and not the land. No new land acquisitions were being made. In the very rare case of a new acquisition because of a structural design, then the title deed holder would be compensated. **Q2:** *Edward Rubi from Gaza Kaloleni ward asked 1) if the new pipeline would be made of metal which would cause adverse health concerns because of corrosion 2) how much % of percentage of jobs would they get, 3) what time would the project commence.* **A1:** Fredrick Mureithi stated that the new pipeline was to be made of a blend of steel and OI which would be the best to withstand weather condition as well as soil and also ensure longevity. **A2&3:** Stephen Chege responded by stating that the consulting team would recommend in the report that all non-technical works within the boundaries of the county should be given to the locals as a first priority. This would include youth, women and disadvantaged

groups. He further stated that this was only the first of many meetings within the entire project and that there involved many process before project completion hence there was no specific date of the start of the works.

Q3: *Mr Abdalla Juma from Majengo Village who is the chairman of water in the Kaloleni ward asked if the water from Mzima 2 project was only for Taita Taveta County or Mombasa*

A: Mr. Stephen Chege stated that the CWSB is a body that provided the infrastructure and distribution of water to water companies in the coast region. In this project, Mzima 2 water would service 5 counties.

Q3: *Prisillah Mshimba from sikujua village asked what were the compensation timelines 2) she further asked whether the water from Mzima 2 would be used for irrigation 3) she gave a suggestion that since they were the county of origin for the Mzima water, the county should be given priority in the distribution of water.*

A1: Ms. Victoria Mumbi stated that the project would aim at causing the most minimal disturbance to the community. All permanent and semi-permanent structures as well as crops would be valued and compensated. The notice to vacate would be between 90 days to 6 months after compensation.

A2: She added that the Mzima 2 spring water would be used for domestic, livestock and industrial purposes.

Comment 1: *Wakiu Mzozo suggested that the resettlement period should be sufficient to aid the affected persons in the relocation and to return to their normal lives. She further suggested that the CWSB should in the environmental protection and preservation of the Makueni Chyulu Hills catchments so that to ensure that there is no shortage of water.*

Comment 2: *Jackline Mpendwa requested that the first priority in the job opportunities should be given to the locals including youth and women.*

Q4: *Festus Mzee asked if damaged crops and fruit trees would be compensated.*

Victoria Mumbi responded by saying that all damaged crops or cut down trees would be documented during crop inventory in the farms areas and they would be compensated of the value of their harvest. If also there id dumping of soil on your farm, then there would be a 15% disturbance allowance.

6	**FINAL REMARKS** *The chief then invited the area MCA for Kaloleni ward Mr. Omar Ahmed who welcomed the project stating that the elected leaders have long campaigned for it and that he was glad that it is actualized. He suggested that the compensation timelines should be realistic, timely, fair and should encompass justice to the local communities. All PaPs should be compensated before construction commences. He also added that the county government should work with the contractor to ensure that all interests of the community are considered. He also stated that the contractor should conclude beforehand what project of benefit or CSR project he would benefit the community before the project ends. He concluded by stating that the community has very high expectation on the delivery of this important asset to the community hence CWSB should work very closely with the contractor.*

The meeting was adjourned and concluded at 01:00hrs with a word of prayer by one religious leader.

Minutes confirmed and signed off by;

Confirmed by ..... **Date 11/05/2018** .....

SENIOR CHIEF VOI LOCATION

Signed off by ..... **Date 11/05/2018** .....

6	**FINAL REMARKS** *The chief then invited the area MCA for Kaloleni ward Mr. Omar Ahmed who welcomed the project stating that the elected leaders have long campaigned for it and that he was glad that it is actualized. He suggested that the compensation timelines should be realistic, timely, fair and should encompass justice to the local communities. All PaPs should be compensated before construction commences. He also added that the county government should work with the contractor to ensure that all interests of the community are considered. He also stated that the contractor should conclude beforehand what project of benefit or CSR project he would benefit the community before the project ends. He concluded by stating that the community has very high expectation on the delivery of this important asset to the community hence CWSB should work very closely with the contractor.*

The meeting was adjourned and concluded at 01:00hrs with a word of prayer by one religious leader.

Minutes confirmed and signed off by;

Confirmed by ..... **Date 11/05/2018** .....

SENIOR CHIEF VOI LOCATION

Signed off by ..... **Date 11/05/2018** .....

Appendix 9: Minutes of Maungu Consultation meetings

MINUTES OF PUBLIC STAKEHOLDER MEETING HELD ON 8th May 2018 FROM 1047 HRS AT CHIEF'S OFFICE COMPOUND

MAUNGU LOCATION

PRESENT: All members who attended the meeting are annexed to this minutes.

Minute	Deliberation
1.	Introduction of Consultant's Team
2.	The area chief Peter Shauri Rangi introduced the county representative present Tavevo water officials and the consultant team that were present and gave a short brief of the purpose of the meeting.
	Opening Remarks
	Joy Wasirimba gave opening remarks on the project and requested questions to be directed to the consultant members present. She also emphasized on the importance of community participation and encouraged the participants to be free and open as their input was very valuable.
	She outlined that Mzima II Springs Pipeline ESIA and RAP was awarded to Francis Allen Consulting Ltd by Coast Water Service Board (CWSB) and financed by EXIM Bank.
3.	**Presentation of the proposed project to the stakeholders**
	Hiram Gacinah emphasized on the role of NEMA and the importance of Environmental and Social Impact Assessment (ESIA) on all projects so as to cushion the community against environmental degradation during pipeline construction
	He then encouraged the participants to give their comments, opinions and views on the proposed works.
4.	**Question & Answer session**
	Q1: Andrew Manyolo *asked if the Ndara – Kale water project systems components were ready in place how come water is not yet flowing as expected to their respective water tanks at Ndara and Sagalla Ranches*
	A: Mr. Wairo from CWSB explained that the water supply scheme in question falls under the Tavevo water service board and it is still under construction and it will be soon be ready
	Q2: Andrew Manyolo *asked if water supplied by Mzima II pipeline will be used for irrigation as well since the area has serious water stress with regard to crop farming*
	A: Hiram Gacinah explained that the project main objective was to provide domestic water supply and not water for irrigation however, he proposed that there was need to trap runoff during wet seasons through man made dams and ponds which can be used for irrigation
	Q3: Abdinar Mwakilomba *asked where will be new pipeline will be set up/ constructed*
	A Mr. Wairo from CWSB explained that the wayleave of 30m as provided from pervious design will be sufficient
	Q4: Maryann Viena asked if the CSR would build a hall for the community so that the meetings could be housed therein
	A: Joy Wasirimba stated that this recommendation will passed forward to the relevant authorities for action
	Q5: Rashid Ndolo asked if the 30m wayleave also covers for the construction of the new and was concerned if there would be compensation if otherwise
	A: Hiram Gacinah explained that the surveyors will work hand with the relevant Authorities to ensure the setting up of the new pipeline follows the design as much as possible and in case there sections where land acquisition is deemed necessary then the affected persons will be compensated
	Q6: William Alewa asked if in case the part of wayleave along pipeline is owned by people who haven't developed them or constructed anything will they be compensated
	A: Joy Wasirimba stated that in such case this will be not compensation claims since the land is under the wayleave

CHIEF MARUNGU LOCATION

Q7: Alex Kyongera asked whether the established beacons on the existing line will still be used and will the line be on the left or the right hand side was money

A: Mr. Wairo from CWSB explained that the actual details for the setting up of the new pipeline will be determined ones the surveyor is on ground and he also emphasized that the same beacons will be used during the setting up process

Q8: Crispine Mwashigadi asked How will the contractor will mitigate the dust generated from the construction activities and will there be compensation in case the people living along the pipeline get sick from the fumes and dust from the construction exercise

A: Joy Wasirimba stated that the mitigation measures will be handled in full under EMPP and CESMP she also urged the locals to report to the area chiefs in cases where the contractor fails to adhere to the mitigation procedures use of hazard signage

Q9: Crispine Mwashigadi asked TAVEVO and CWSB to explain the current distribution failures where piped water seems to be flowing for months without be repaired this has resulted to flood in some sections and yet the locals will be required to pay for leaked water

A. Mr. Wairo from CWSB and Charles Mwangoma TAVEVO explained the matter is being looked into at the moment and urged that such cases should be reported to the chief in case the relevant authority delay to act

Q10: Idris Mohammed asked whether there will employment opportunities for locals ones the project goes to construction stage

A: Joy Wasirimba stated that the locals will be absorbed as semi-skilled and casual 100% to the project as provided by the Employment Act

Q11: William Mukwangi asked in case the jobs that supposed to be allocated to locals are is given to outsiders how should address this issue

A: Joy Wasirimba stated that the locals will be absorbed as semi-skilled and casual 100% to the project as provided by the Employment Act and in case this doesn't happen the area chief together with area leaders should engaged the contractor to see this is observed

Q12: Henry Mwaguma asked and recommended that another session like this should be organized by the contractor before construction starts

A: Joy Wasirimba stated that this recommendation will be passed to the contractor for action

There was no AOB.

The meeting adjourned at 12:30pm with a word of prayer from Crispine Mwashigadi

Appendix 10: Minutes of Mackinnon Consultation meetings

CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE

MINUTES OF COMMUNITY PUBLIC PARTICIPATION MEETING HELD ON 03rd MAY 2018 FROM 02:00 HRS AT MACKINON ROAD MUSLIM HALL

Coordinates: S 3° 43' 14.3754" E 39° 1' 44.356"

PRESENT: All members who attended the meeting are annexed to this minutes.

The meeting was called to order by the area chief at 02:00pm and prayers were conducted by Abdulahi Abdirahman.

Minute	Deliberation
1.	**Introduction of Consultant's Team** The Assistant Chief called the meeting to order and introduced the stakeholders and the consultant team that was present and gave a short brief of the purpose of the meeting. He then introduced the various village elders who welcomed all the members present in the meeting.
2.	**Opening Remarks** Dr. Stephen Chege introduced the project and requested questions to be directed to the consultant members present. He also emphasized on the importance of community participation and encouraged the participants to be free and open as their input was very valuable. He further outlined that the mandate of Coast Water Services Board (CWSB) and the importance of the construction of Mzima 2 as it will supplement water supplied by Mzima 1. He further stated the importance of an EIA assessment on all projects affecting the community. He stated that there will also be an Environmental Social Impact Assessment (ESIA) as well as Resettlement Action Plan (RAP) detailing the process of persons and asset assessment to be affected by the project. He concluded by stating that CWSB aims at creating a win-win scenario.
3.	**Presentation of the proposed project to the stakeholders** Engineer Fredrick Mureithi introduced the Mzima 2 project to the community whose source is Chyulu hills in Tsavo East national park and would be 220 km long. Its design volume is

	105,000m³ with a diameter of 4ft. The way leave would be 30m from end to end as there was need for some way to enable construction and maintenance. He stated that the pipeline would be adjacent to the Mzima 1 pipeline with better construction materials to withstand weather, soil as well as time. He stated that it was expected that this water project would be able to service the coast region water demands up to 2035. Ms. Victoria Mumbi introduced the RAP process and stated that the project was following the World Bank guidelines in regard to compensation which states that any project was supposed to leave the locals even better than they were before financially and cause the most minimal disturbance to them. There would be census taking place as well as asset inventory of persons and properties along the pipeline corridor. She further stated that those PAPs would be compensated on their development and given between 90days to 3months to relocate. She further stated that no affected person would be left behind as all will be documented.
4.	**Question & Answer session** **Q1:** *Abdi Noor Mohammed asked the timelines of the project as they were very expectant with the water shortage problem at Mackinon. 2) He further commented that the water shortage had been caused by the perennial pipe bursts. Would CWSB repair the damage as they await Mzima 2.3) How will they be protected from the pollution during construction* **A:** Dr. Stephen Chege stated that the meeting was among the first of many to be done throughout the project and there were any processes and structures to be established before the project can commence hence he could not pin point a specific timeline.2) He added that CWSB would continue servicing the old pipeline until the new one is commissioned.3) He responded and said that there will be dust screens which will help to manage the dust. No works will be done at night and there will be danger signs and tapes all around the site to avoid injury.
5	**Q2:** *Mr Moses Msasu Maasai asked that how the way leave would be measured so that to know if one is in the pipeline corridor or not* **A:** Mr. Fredrick Mureithi responded by stating that the way leave is measured from the center of the old pipe on both sides of 51m on either sides. **Q3:** *Elena Mohammed asked if the pipeline project would compensate the business owner who is a tenant or the land lord who are on the way leave.*

	A: Ms. Victoria Mumbi stated that the wayleave of the pipeline had already been set as 30m and this land belonged to the government. The affected persons would be compensated. Both the land lord and the business owner. All permanent and semi-permanent structures as well as crops would be valued and compensated. ***Comment 1:*** *Patrick Mwaniki commented that they had been casualties of many projects who promise to compensate but they never fulfill. He further suggested that there should be a written agreement between the local community leaders and the contractor so that they are compensated before work starts.* **Q4:** Shaban Salim asked what would happen to their water needs as during construction as most times water is cut off during construction. **A:** Stephen Chege responded and stated that CWSB have committed to repair the old line before the completion of the new one as it can service the needs of the community and the contractor will be advised not to cause damage to the old pipe. ***Q5:*** *Shaban Salim asked if there is a component in the project that would cater for CSR.* **A:** Stephen Chege responded by saying in every project there is a certain percentage of money set aside for the benefit of the community and in this case it would not be different..

The meeting was adjourned and concluded at 05:30hrs with a word of prayer by one religious leader.

Minutes confirmed and signed off by;

Confirmed by ..... **Date 11/05/2018** .....

CHIEF MACKINNON RUA LOCATION

Signed off by **Date 11/05/2018**

....

Appendix 11: Minutes of Mbololo Consultation meetings

MINUTES OF PUBLIC STAKEHOLDER MEETING HELD ON 8th May 2018 FROM 1047 HRS AT CHIEF'S OFFICE COMPOUND

MBOLOLO LOCATION (TAUSI DIVISION)

PRESENT: All members who attended the meeting are annexed to this minutes.

Minute	Deliberation
1.	**Introduction of Consultant's Team**
2.	The area chief Eliud Mbogho Majani introduced the county representative present TAVEVO water officials and the consultant team that were present and gave a short brief of the purpose of the meeting.
	Opening Remarks
	Joy Wasirimba gave opening remarks on the project and requested questions to be directed to the consultant members present. She also emphasized on the importance of community participation and encouraged the participants to be free and open as their input was very valuable.
	She outlined that Mzima II Springs Pipeline ESIA and RAP was awarded to Francis Allen Consulting Ltd by Coast Water Service Board (CWSB) and financed by EXIM Bank.
	Presentation of the proposed project to the stakeholders
3.	Hiram Gacinah emphasized on the role of NEMA and the importance of Environmental and Social Impact Assessment (ESIA) on all projects so as to cushion the community against environmental degradation during pipeline construction.
	He then encouraged the participants to give their comments, opinions and views on the proposed works.
	Question & Answer session
4.	Q1: Ronald Kiriga *asked* How will the community benefit from the project since the pipeline doesn't traverse or pass next to their area.
	A: Hiram Gacinah explained that the pipeline had accounted for additional 10,000m^3/d for supply locals along the pipeline. With distribution plans under the TAVEVO water service board and CWSB this water should be piped to serve the community one the pipeline has been installed.
	Q2: Costina Msamburi *asked* if the capacity of the intake will be sufficient to support the current design since the currently water rationing is a serious challenge in the area.
	A: Hiram Gacinah explained that from the studies carried out during design and the pipeline improvements made. The intake was observed to be in good shape and pipeline will be sustainable without adversely affecting normal flow of the spring at 1m^3/s will be maintained.
	Q3: Retired Rev Mwakio *asked* if the water from the pipeline could also be used for irrigation purposes.
	A: Hiram Gacinah explained that the project main objective was to provide domestic water supply and not water for irrigation however, he proposed that there was need to trap runoff during wet seasons through man made dams and ponds which can be used for irrigation.
	Q3: Costina Msamburi *asked where will be new pipeline will be set up/ constructed* A Mr. Wairo from CWSB explained that the wayleave of 30m as provided from pervious design will be sufficient.
	Q4: Nathan Munyao asked why the can't current design be changed to in order to provide a T connection through the village and its environs.
	A Mr. Wairo from CWSB and Charles Mwangoma TAVEVO explained the matter is being looked into at the moment and urged that ones the pipeline is in place they will ensure that water supply and distribution network will be set up.
	There was no AOB.
	The meeting adjourned at 12:30pm with a word of prayer from retired Rev Mwakio.

OFFICE OF THE PRESIDENT
CHIEF
MBOLOLO LOCATION
Date 11/5/18
P.O Box 1-80300, MOI

Appendix 12: Minutes of Ngolia Consultation meetings

CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE

MINUTES OF COMMUNITY PUBLIC PARTICIPATION MEETING HELD ON 08th MAY 2018 FROM 04:00 HRS AT NDII CHIEF'S CAMP

PRESENT: All members who attended the meeting are annexed to this minutes.

The meeting was called to order by the area chief at 04:00Pm and prayers were conducted by Edson Shangora.

Minute	Deliberation
1.	**Introduction of Consultant's Team** The senior Assistant Chief Mr.Ezekiel Malombo called the meeting to order and introduced the stakeholders and the consultant team that was present and gave a short brief of the purpose of the meeting. He then introduced the ward administrator Mr.James Mwabole who welcomed all the members present in the meeting. He then welcomed the area MCA Mr. Jones M. Solomon who then highlighted his expectations in regard to the Mzima 2 project who stated that Ngolia community had suffered for many years with lack of water and yet the source of the water was their community.
2.	**Opening Remarks** Dr. Stephen Chege introduced the project and requested questions to be directed to the consultant members present. He also emphasized on the importance of community participation and encouraged the participants to be free and open as their input was very valuable. He further outlined that the mandate of Coast Water Services Board (CWSB) and the importance of the construction of Mzima 2 as it will supplement water supplied by Mzima 1. He further stated the importance of an EIA assessment on all projects affecting the community. He stated that there will also be an Environmental Social Impact Assessment (ESIA) as well as Resettlement Action Plan (RAP) detailing the process of persons and asset assessment to be affected by the project. He concluded by stating that CWSB aims at creating a win-win scenario.
3.	**Presentation of the proposed project to the stakeholders**

	Engineer Fredrick Mureithi introduced the Mzima 2 project to the community whose source is Chyulu hills in Tsavo East national park and would be 220 km long. Its design volume is 105,000m³ with a diameter of 4ft. The way leave would be 30m from end to end as there was need for some way to enable construction and maintenance. He stated that the pipeline would be adjacent to the Mzima 1 pipeline with better construction materials to withstand weather, soil as well as time. He stated that it was expected that this water project would be able to service the coast region water demands up to 2035. Ms. Victoria Mumbi introduced the RAP process and stated that the project was following the World Bank guidelines in regard to compensation which states that any project was supposed to leave the locals even better than they were before financially and cause the most minimal disturbance to them. There would be census taking place as well as asset inventory of persons and properties along the pipeline corridor. She further stated that those PAPs would be compensated on their development and given between 90days to 3months to relocate. She further stated that no affected person would be left behind as all will be documented.
4.	**Presentation by Tavevo Water and sewerage company and other formal stakeholders.** Tavevo Water and sewerage company board chairman Mr. Costa Malai introduced himself as well as other board members who has accompanied him as follows: 1) Dr. Jimmy Kihara-Director, human resource head at Tavevo. 2) Mohammed Ali-Director, Financial audit head at Tavevo. 3) Edward Mwaburi- SCOO, Min of water and irrigation, Voi. He outlined the role of Tavevo as the body involved in the distribution of water as well as putting up local water connections to the local community. He stated that the new Tavevo board was in office for only 54 days and that they had taken note of the many issues regarding distribution and billing and were working to solving it. He stated that they had put up zonal offices to build close working relationships with the community.
5	**Question & Answer session** **Comment1:** *Joram Mwanzo gave his comment and said that the engineers in the project should make sure most of the water in the pipeline flows by gravity instead of pumping as it would cut costs which are sometimes passed on to the consumer.*

	A: Stephen Chege responded by saying in every project there is a certain percentage of money set aside for the benefit of the community and in this case it would not be different. ***Comment 2:*** *Amos Mathias Mngenyi gave a comment and said that the design should consider the Ngolia community as it has given an offtake at 15km before reaching Voi which is far and would need pumping back so that they can have access to it. This pumping he said that it would reduce the pressure of the water which would cause the majority not getting water as they reside in the hilly areas. He suggested that the offtake area would be increased to 30km so that it can be near Ndii center where they would be able to draw water.* ***Comment 3:*** *The area MCA Mr. Jones Solomon gave a comment and said that CWSB should ensure that the contractor sources all non-technical works to the local community as the women and youth are in dire need of job opportunities. He also stated that before the project end, the community should be left with benefits of the CSR part of the project such as the contractor should build a school, a hospital or a road to service the community.*

The meeting was adjourned and concluded at 05:30hrs with a word of prayer by one religious leader.

Minutes confirmed and signed off by;

Confirmed by ..... **Date 11/05/2018**

Signed off by ..... **Date 11/05/2018**

CHIEF
NGOLIA LOCATION
P.O. Box KITIVO
VIA VOI
DATE:

Appendix 13: Lead Expert Annual Practicing License

FORM 7

(r.15(2))

nema

mazingira yetu | uhai wetu | wajibu wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

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

License No : NEMA/EIA/ERPL/7149

Application Reference No: NEMA/EIA/EL/10121

M/S **Dr Stephen Chege Wairuri**
(individual or firm) of address

P.O. Box 6710-01000, Thika

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **1580**

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

Issued Date: **2/12/2018**

Expiry Date: **12/31/2018**

Signature.....

(Seal)

Director General
The National Environment Management Authority

P.T.O.

ISO 9001: 2008 Certified

Appendix 14: Lead Expert Annual EIK Certificate

Appendix 15: Noise Measurements

CICU

CHEMICAL & INDUSTRIAL CONSULTANCY UNIT
Department of Chemistry, University of Nairobi
Chiromo Campus, P.O. Box 30197, Tel. 4440042, 4442014, Tel/Fax: 4446138, Nairobi

Our ref.: CLAB MWP 18.099N 21st May 2018

NOISE ASSESSMENT REPORT OF THE PROPOSED MZIMA II WATER PIPELINE.

A. INTRODUCTION

Intense noise may lead to sleep disturbance, mental exhaustion, irritation, gradual hearing disabilities and deafness. The baseline noise levels were thus determined on 18th May 2018 at three sites listed in the table below. This was in compliance with the Environmental Management and Coordination Act, 1999.

B MEASUREMENT OF THE NOISE LEVELS

The noise level measurements were carried out using an Extech Sound Level Meter Model 407732.

C. RESULTS: See the table below

SITE AND DATE	GLOBAL POSITIONING SYSTEM (GPS) COORDINATES	**RANGE IN NOISE LEVELS (DECIBELS)**	**NEMA PERMISSIBLE NOISE LEVELS (COMMERCIAL AND CONSTRUCTION SITES)**
MZIMA SPRING (TSAVO WEST NATIONAL PARK IN TAITA TAVETA COUNTY) (18-05-2018)	Latitude:- 02.98199 Longitude: 038.02216	54.6-55.5	DAY: 60 DECIBELS NIGHT: 35 DECIBELS
NDII (IN TAITA TAVETA COUNTY) (18-05-2018)	Latitude:- 03.2373 Longitude: 038.50619	61.6-89.3	
MAUNGU (NEAR KENYA PIPELINE MAUNGU STATION IN TAITA TAVETA COUNTY) (18-05-2018)	Latitude:- 03.561049 Longitude: 038.7531	63.1-78.7	

D **OBSERVATIONS**

Noise measurements were carried out during the day. The lowest noise levels at the Mzima Spring site did not exceed the NEMA permissible levels for commercial, residential and construction sites. However the highest noise intensity that was recorded at the two sites (Maungu and Ndii) exceeded the NEMA permissible guideline value (60 decibels during the day). The elevated noise along this proposed water pipe line was mainly due to the movement of vehicles in the Voi – Mombasa road which is busy with a lot of heavy commercial vehicles.

E **RECOMMENDATION**

The architectural design of the water pipe line should maintain low noise levels so that the animals are not disturbed more so in the park.

Godfrey A.Wafula

For CICU
Department of Chemistry

Consultants in: Chemical Processes & Technologies, Pollution & Environmental Control and Monitoring, Quality Assurance & Specialized Laboratory Analysis

Appendix 16: Air Quality Measurements

CHEMICAL & INDUSTRIAL CONSULTANCY UNIT
Department of Chemistry, University of Nairobi
Chiromo Campus, P.O. Box 30197, Tel. 4440042, 4442014, Tel/Fax: 4446138, Nairobi

Our ref.: CLAB MWP 18.098 21st May 2018

AIR QUALITY ASSESSMENT REPORT OF THE PROPOSED MZIMA II WATER PIPELINE.

INTRODUCTION

The rapid development in infrastructure and substantial population growth in Coast region and its neighbourhood, during the last decade, have put enormous pressure on existing public utilities. Expansion of water pipe line in any given area will therefore result in increased availability of the water to the people.

Water pipe line network will obviously enhance pollution levels along this region. Air pollution has adverse effects on human health and the physical environment. It is consequently necessary to minimize airborne contamination while developing the water pipeline.

Aerial pollution control can only be effective if data on existing air quality is obtained. The Environmental Management and Coordination Act, 1999 also made it mandatory to carry out environmental impact assessments prior to the commencement of construction projects.

Air quality assessment was thus carried out on 18th May 2018 at three sites listed in the table below.

SAMPLE COLLECTION

Air samples were collected using a portable battery driven suction pump whose flow rate was 3.61 litres per minute. The air was scrubbed through suitable trapping solutions for sulphur dioxide and nitrogen dioxide for periods of 15 minutes per sample. Total suspended particulate matter (dust) was trapped in pre-weighed and pre-conditioned membrane filters for the same period. The CO/CO_2 Portable Combustion Analyzer was utilized for assessment of airborne levels of carbon monoxide.

A. QUANTITATIVE DETERMINATION

1. Sulphur dioxide was determined quantitatively using the Pararosaniline method.
2. Nitrogen dioxide was determined using the Modified Griess-Saltzman method.
3. The Filtration Technique followed by gravimetric analysis was used to determine the airborne concentrations of total suspended particulate matter (dust).

4. The concentrations of carbon monoxide were determined using the CO/CO_2 Portable Combustion Analyzer PCA*3.

B. <u>RESULTS:</u> See the table below

SAMPLING SITE, DATE AND GPS COORDINATES	**PARAMETER**	**CONCENTRATIONS**	**WHO GUIDELINES**	**NEMA AMBIENT AIR QUALITY TOLERANCE LIMITS FOR RESIDENTIAL, RURAL AND OTHER AREAS**
MSIMA SPRING (TSAVO WEST NATIONAL PARK IN TAITA TAVETA COUNTY) (18-05-2018)<u>GPS COORDINATES</u> Latitude:- 02.98199 Longitude: 038.02216	Sulphur dioxide	48µg/m^3	500 µg/m^3 10 minutes 350 µg/m^3 1 hour 125 µg/m^3 24 hours 60 µg/m^3 1 year	80 µg/m^3 -24 hours 60 µg/m^3-Annual Average
	Nitrogen dioxide	36 µg/m^3	120 µg/m^3 8 hours 40 µg/m^3 1 year	80 µg/m^3 -24 hours 60 µg/m^3- Annual Average
	Total Suspended Particulate Matter (dust).	66 µg/m^3	150-230 µg/m^3 24 hours 60-90 µg/m^3 1 year	180 µg/m^3 -24 hours 100 µg/m^3 -Annual Average
	Carbon monoxide	88 µg/m^3	30 mg/m^3 1 hour 10 mg/m^3 8 hours	2 mg/m^3-8 hours 4 mg/m^3-1 hour
NDII (IN TAITA TAVETA COUNTY) (18-05-2018)) GPS COORDINATES Latitude:- 03.2373 Longitude: 038.50619	Sulphur dioxide	351 µg/m^3	500 µg/m^3 10 minutes 350 µg/m^3 1 hour 125 µg/m^3 24 hours 60 µg/m^3 1 year	80 µg/m^3 -24 hours 60 µg/m^3-Annual Average
	Nitrogen dioxide	54 µg/m^3	120 µg/m^3 8 hours 40 µg/m^3 1 year	80 µg/m^3 -24 hours 60 µg/m^3- Annual Average
	Total Suspended Particulate Matter (dust).	123 µg/m^3	150-230 µg/m^3 24 hours 60-90 µg/m^3	180 µg/m^3 -24 hours 100 µg/m^3

			1 year	-Annual Average
	Carbon monoxide	328µg/m^3	30 mg/m^3 1 hour 10 mg/m^3 8 hours	2 mg/m^3-8 hours 4 mg/m^3-1 hour
MAUNGU (NEAR KENYA PIPELINE MAUNGU STATION IN TAITA TAVETA COUNTY) (18-05-2018) COORDINATES Latitude:- 03.561049 Longitude: 038.7531	Sulphur dioxide	336 µg/m^3	500 µg/m^3 10 minutes 350 µg/m^3 1 hour 125 µg/m^3 24 hours 60 µg/m^3 1 year	80 µg/m^3 -24 hours 60 µg/m^3-Annual Average
	Nitrogen dioxide	49 µg/m^3	120 µg/m^3 8 hours 40 µg/m^3 1 year	80 µg/m^3 -24 hours 60 µg/m^3- Annual Average
	Total Suspended Particulate Matter (dust).	142 µg/m^3	150-230 µg/m^3 24 hours 60-90 µg/m^3 1 year	180 µg/m^3 -24 hours 100 µg/m^3 vg+ -Annual Average
	Carbon monoxide	357µg/m^3	30 mg/m^3 1 hour 10 mg/m^3 8 hours	2 mg/m^3-8 hours 4 mg/m^3-1 hour

NOTE:

(1) µg/m^3 and mg/m^3 means micrograms per cubic metre of air and milligrams per cubic metre of air respectively (1 mg/m^3 =1000 µg/m^3).

(2) NEMA: National Environment Management Authority.

(3) WHO: World Health Organization.

C. OBSERVATIONS

1. The concentrations of sulphur dioxide at two sites along the above mentioned water pipe line exceeded the NEMA Ambient Air Quality Tolerance Limits for Residential, Rural and Other Areas. These levels also exceeded the WHO (24 hour and 1 year) guidelines for ambient air. The elevated concentrations of sulphur dioxide were attributed to emissions from vehicles that were moving along those roads.

2. The levels of nitrogen dioxide at the three sites did not exceed the NEMA and WHO guidelines for ambient air.

3. The concentrations of suspended particulate matter (dust) also did not exceed the NEMA and WHO guidelines for ambient air. They were, in other words, within the NEMA and WHO recommended guidelines.

4. The concentrations of carbon monoxide at these three sites did not exceed both the NEMA and WHO guideline values.

D. RECOMMENDATIONS

1. The construction phase of some sections of this water pipeline may lead to significant emissions of dust. Suitable measures will therefore be necessary in order to contain the dust. These will include periodic sprinkling of water along the affected areas.

Godfrey A. Wafula
For CICU
Department of Chemistry

Appendix 17: Water quality assessment

CHEMICAL & INDUSTRIAL CONSULTANCY UNIT
Department of Chemistry, University of Nairobi
Chiromo Campus, P.O. Box 30197, Tel. 4440042, 4442014, Tel/Fax: 4446138, Nairobi

May 21, 2018

LABORATORY ANALYSIS REPORT FOR MZIMA SPRING WATER (LATITUDE: -02.98199, LONGITUDE: 038.02216)

Laboratory No.: ODP-01/18/05/18
Date Received: 18/05/2018

Parameters	Units	Results	NEMA
PH @ 21^{0}C		7.3	6.5-8.5
Total Suspended Solids	Mg/L	13.2±1.17	30
Total Dissolved solids	Mg/L	321±15.6	1200
COD	Mg/L	10.22±0.03	50
Chloride	Mg/L	0.1	250
Oil & Grease	Mg/L	ND	10
Total Coliform	(Counts /100 ml)	Nil	30
E-coli	(Counts /100 ml)	Nil	Nil
Color	CU	4.6	15
Cr	Mg/L	ND	0.05
Pb	Mg/L	ND	0.01
Phosphates	Mg/L	0.33±0.00	2.2
Nitrates	Mg/L	2.10±0.011	50

NB: Based on these parameters, the sample conforms to the Nema specifications

Godfrey A. Wafula
For CICU

CHEMICAL & INDUSTRIAL CONSULTANCY UNIT
Department of Chemistry, University of Nairobi
Chiromo Campus, P.O. Box 30197, Tel. 4440042, 4442014, Tel/Fax: 4446138, Nairobi

May 21, 2018

LABORATORY ANALYSIS REPORT FOR NDII WATER (LATITUDE: - 02.98199, LONGITUDE: 038.02216)

Laboratory No.: ODP-02/18/05/18

Date Received: 18/05/2018

Parameters	Units	Results	NEMA
PH @ 21^{0}C		6.9	6.5-8.5
Total Suspended Solids	Mg/L	27.03±1.6	30
Total Dissolved solids	Mg/L	515±22.8	1200
COD	Mg/L	11.3±0.97	50
Chloride	Mg/L	1.8	250
Oil & Grease	Mg/L	1.78±0.00	10
Total Coliform	(Counts /100 ml)	2	30
E-coli	(Counts /100 ml)	Nil	Nil
Color	CU	11	15
Cr	Mg/L	ND	0.05
Pb	Mg/L	ND	0.01
Phosphates	Mg/L	1.77±0.09	2.2
Nitrates	Mg/L	4.16±0.106	50

NB: Based on these parameters, the sample conforms to the Nema specifications

Godfrey A. Wafula
For CICU

CHEMICAL & INDUSTRIAL CONSULTANCY UNIT
Department of Chemistry, University of Nairobi
Chiromo Campus, P.O. Box 30197, Tel. 4440042, 4442014, Tel/Fax: 4446138, Nairobi

May 21, 2018

LABORATORY ANALYSIS REPORT FOR MAUNGU WATER (LATITUDE: : - 03.561049, LONGITUDE: 038.7531)

Laboratory No.: ODP-03/18/05/18

Date Received: 18/05/2018

Parameters	Units	Results	NEMA
PH @ 21^{0}C		7.6	6.5-8.5
Total Suspended Solids	Mg/L	29.01±0.44	30
Total Dissolved solids	Mg/L	695±64.82	1200
COD	Mg/L	9.26±0.01	50
Chloride	Mg/L	2.7	250
Oil & Grease	Mg/L	3.44±0.01	10
Total Coliform	(Counts /100 ml)	Nil	30
E-coli	(Counts /100 ml)	Nil	Nil
Color	CU	14.54	15
Cr	Mg/L	ND	0.05
Pb	Mg/L	0.003±0.00	0.01
Phosphates	Mg/L	1.09±0.001	2.2
Nitrates	Mg/L	6.37±0.97	50

NB: Based on these parameters, the sample conforms to the Nema specifications

Godfrey A. Wafula
For CICU

Appendix 18: Conservation Organisations Reponses

AFRICAN WIILDLIFE FOUNDATION

INTRODUCTION

Coast Water Services Board proposes to construct a second water Pipeline from Mzima Springs (Mzima II). The project will abstract 105,000M³ /day to supply water for communities along the pipeline corridor and Mombasa city. The pipeline will run next Mzima I in the existing way leave. Kindly respond to this questionnaire which is part of the EIA process. Your input will be highly appreciated.

Respondent information

Name: --Kimitei Kenneth ----------
Institution: ---African Wildlife Foundation – Tsavo Office----------
Position: -------Landscape Ecologist----------
Address/Telephone: ----kkimitei@awf.org----------
ID No.: ----------22366427----------

i. In your opinion, what positive impacts do you think will result from the proposed Mzima II project?

---------1. Improve local community health through availability of clean water ----------
---------2. Triggers economic development in already or upcoming towns----------
---------3. Creation of employment directly or indirect ----------
---

---

ii. Do you anticipate potential negative impacts from the proposed Mzima II project? Yes/ No

iii. If yes, enumerate these potential negative impacts.

---------1. Air pollution by machines and dust ----------
---------2. Soil pollution by fuel and oils used by the machines ----------
---------3. Water pollution especially on areas close to the spring and rivers ----------
----------4. Loosening of soils which may lead to wind and water erosion----------
----------5. Displacement of wildlife along the pipeline due to the intensity of the works----------
---

---

iv. Suggest how the potential negative impacts in (iii) above can be mitigated

----------1. Use improved silencers in the machines to avoid noise pollution----------
----------2. Water loose soils ----------
----------3. Rehabilitate areas impacted by the works through planting grass ----------
----------4. Proper maintenance of the machines and in designated areas ----------

DAVID SHELDRICK TRUST

INTRODUCTION

Coast Water Services Board proposes to construct a second water Pipeline from Mzima Springs (Mzima II). The project will abstract 105,000M³ /day to supply water for communities along the pipeline corridor and Mombasa city. The pipeline will run next Mzima I in the existing way leave. Kindly respond to this questionnaire which is part of the EIA process. Your input will be highly appreciated.

Respondent information

Name: Angela Sheldrick
Institution: The David Sheldrick Wildlife Trust
Position: CEO
Address/Telephone: P.O. Box 15555, Mbagathi, 00503, Nairobi, +254 (0) 202 310 396
ID No.:

i. In your opinion, what positive impacts do you think will result from the proposed Mzima II project?

None.

ii. Do you anticipate potential negative impacts from the proposed Mzima II project? Yes/ No

Yes.

iii. If yes, enumerate these potential negative impacts.

The Atkins report warns that the proposed abstraction will take almost 70% of the spring low flows and that the proposed combined Mzima and Baricho abstractions will take 90% of minimum river flows. The Atkins report warns of negative impacts on the ecology of the Tsavo River and also the Sabaki delta. These technical observations concern us.

The Atkins report only considers potential abstractors from Tsavo River between Mzima and Athi River confluence. The report considers the impact of abstractors to be limited, which is not surprising as this section of the river flows within an unpopulated national park. What about abstractors downstream of the confluence with Athi River? And what about wildlife? Abstractors and wildlife will inevitably be negatively impacted by the proposed project. What is the economic cost of doing this?

Mzima Springs are located within a dry part of Kenya where water sources are scarce. This water is needed to sustain the local area's ecosystems and to help meet the local area's long-term water needs. Removing the Mzima water to Mombasa is a huge negative impact on the local area.

iv. Suggest how the potential negative impacts in (iii) above can be mitigated

Without sight of the Coast Water Master Plan, it is impossible for us to comment properly. The Coast Water Supply should be developing sustainable water sources locally. Harvested rainwater and desalinated seawater are under-exploited renewable resources, and the Coast enjoys abundant solar energy. The Atkins report does not mention Mwache Dam very close to Mombasa. This project is currently being implemented near Mombasa by Coast Development Agency. Mwache will yield 2.8 m3/s through harvesting runoff from rainfall. Developing local renewable sources is preferable to destroying valuable and unique inland wetland ecosystems.

NATIONAL IRRIGATION BOARD (GALANA KULALU)

INTRODUCTION

Coast Water Services Board proposes to construct a second water Pipeline from Mzima Springs (Mzima II). Kindly respond to this questionnaire which is part of the EIA process. Your input will be highly appreciated.

Respondent information

Name: Eng. Henry Ochiere
Institution: National Irrigation Board (Galana Kulalu Food Security Project)
Position: Resident Engineer
Address/Telephone: 0721315421
ID No.: 9183191

i. In your opinion, what positive impacts do you think will result from the proposed Mzima II project?

The population being supplied by water from the spring would have their health improved, time otherwise used to search for domestic water saved, develop arising secondary investments from the water so supplied.

The project will create employment and income generation both directly and indirectly.

ii. Do you anticipate any negative impacts on your operations from the proposed Mzima II project? Yes

iii. If yes, enumerate these potential negative impacts.

Overexploitation of the Mzima Spring resourse may create ground water recharge and ecological imbalance. Negative pressure may cause collapse of the recharge sinkholes or drying of surface water supply from the source (Chyulu Hills)

The pipeline construction, operation and maintenance may interfere with wildlife, human settlement and existing infrastructure.

Effects of global warming.

iv. Suggest how the potential negative impacts in (iii) above can be mitigated

A feasibility study should be conducted or reviewed by bringing on board the emerging issues to balance the current social needs, environmental implications and the future generations.

v. I approve the proposed Mzima II project.
   - With conditions (Enumerate the conditions)
     After a comprehensive feasibility study addressing all possible negative impacts and stakeholder engagement.

SAVE THE ELEPHANT

INTRODUCTION

Coast Water Services Board proposes to construct a second water Pipeline from Mzima Springs (Mzima II). The project will abstract 105,000M³ /day to supply water for communities along the pipeline corridor and Mombasa city. The pipeline will run next Mzima I in the existing way leave. Kindly respond to this questionnaire which is part of the EIA process. Your input will be highly appreciated.

Respondent information

Name: Benson Okita Ouma
Institution: Save The Elephants
Position: Head of Monitoring
Address/Telephone: P.O. Box 54667
ID No.: ------N/A------

i. In your opinion, what positive impacts do you think will result from the proposed Mzima II project?

1. *Residents of Voi and Mombasa will benefit from adequate supply of clean drinking water.*

ii. Do you anticipate potential negative impacts from the proposed Mzima II project? ***Yes***/ No

iii. If yes, enumerate these potential negative impacts.

1. *It is a relief to learn from your proposal that East Africa is destined for more precipitation in the coming years. However, even though Souverijns et al. (2016) echoes this phenomenon in their research titled drivers of future changes in East African precipitation (* http://iopscience.iop.org/article/10.1088/1748-9326/11/11/114011.*), the actual change is estimated at 23% and mainly north of equator. South of Equator where Chyulu/Tsavos lie will is predicted to become drier. Key concern is the seven times water abstraction that is, from the current 15,000ml to 105,000ml per second may not cope with supply despite the project relying heavily on the general predicted increase in precipitation.*
2. *The Mzima springs flow into the Tsavo River and then the Tsavo River flows into the Athi River which becomes the Galana River. At present the Galana River is getting very low in the dry season and in 2016 we had the most serious green algal bloom in the Galana River due to pollution upstream. If the flow from the Tsavo River is going to be diminished by x7 that means 7 times less clean water is going to flow into the Galana which is presently (presumably) diluting all the horrible pollutants coming down from the Athi River. This presumably means the Galana River flowing through Tsavo will have the Athi River pollutants concentrated. This must surely affect the animals that drink the water and the downstream community users/livestock heading towards Malindi.*
3. *Disruption in the parks as you re-build this water pipe line is clearly an issue - based on past observations in Tsavo East when an oil pipeline was re-done, the digging was a total mess, they left piles of soil everywhere without smoothing over the cavities and left mounds of dirt forming solid*

barriers to smaller animals to walk over for months and months of inactivity rather than doing and finishing one section at a time. The actual work on the ground last time was totally unacceptable, animals fell into the trenches that were left open for over a year without any barriers, and when they filled in the pipe line trench there was no effort to "beautify" the repair work. It was a phenomenal tourist eye-site too which people complained about. It was very rare to ever see anyone working on it, the pace was ridiculously slow and inefficient considering it was a national park and all the risk posed to the animals in there.

4. *So although the report focuses on whether the Chyulus can produce 105,000ml per second we would like to see much more EIA information about how a x7 reduced water flow from Mzima Springs will affect downstream users - the exact quote is only this paragraph:* The Tsavo river then flows for approximately 65km before it joins the Athi river. The majority of this reach is within the Tsavo West National Park, so there are no users of the river water other than the animals and plants that depend upon the river. Near the eastern entrance of the park there is one safari lodge (Hippo River), and a second lodge (Maneaters) is also located next to the river, approximately 5km outside of the Park. The field visit confirmed that these lodges rely on borehole supplies rather than the river. The only other potential abstractor on this river is the SGR construction camp, which is temporary. *Borehole water is often affected by underground water - rivers feed into the underground water tables so this seems odd to say that a lodge only relies on a bore hole and not the river water that is connected to.*

iv. Suggest how the potential negative impacts in (iii) above can be mitigated

1. *Balance the increased extraction with actual expected precipitation increase. As currently proposed, looks theoretically rather than practically sustainable. Regulate flow and partner with the Ministry of Wildlife on modalities for paying ecosystem services.*
2. *Have clear biodiversity restoration and offset mechanisms.*

v. ***I approve the proposed Mzima II project.***

- ***With conditions listed in iii and iv above***
- Unconditionally.

vi. I do not approve the proposed Mzima II project. Please give reasons.

Feel free to attach additional information

It is outrageous that the water company, Voi & Mombasa residents are not paying an ecosystem service payment back to the Chyulu Hills and Tsavo National Parks for using all the water for free from a protected area.

Appendix 19: Community members' attendance Lists in Consultation meetings

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(1)

FRANCIS ALLEN CONSULTING

CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE.

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: KASEMENI Date: 03/05/2018 Venue: CHIEF'S CAMP

No.	Name	ID Number	Telephone	Gender	Signature
1.	SAMMY K. MATANO	9887858	0718714730	M	[signature]
2.	HAMISI JIRA	14501477	0713735798	M	[signature]
3.	ISLAM KUTOKA	22432321	0724835665	M	[signature]
4.	HAMISI MWAVITU			M	[signature]
5.	MAZERA MWALICHI			M	
6.	HAMISI .N. JUMA	35054938	0729493573	M	[signature]
7.	NDEKR YA MALEMBA	23828182	0710581502	M	[signature]
8.	JUMAA K -CHANG'OKA	21363927	0726387306	M	[signature]
9.	JUMAA .C. CHIBUJO	35528669	0748371718	M	[signature]
10.	ALII NDEGWA ZUMA	20851939		M	[signature]
11.	BENYASI HASSAN	27699569		M	[signature]
12.	KINELA NGANGA K.	2210026	0724326040	M	[signature]
13.	RAJAB NGUWA MZUNGU	21732474	0722795271	M	[signature]
14.	CHIGAMBA. P. SHERA	11243140	0711849499	M	[signature]
15.	RATI NYAMAWI	11228279	0721783524	M	[signature]
16.	MANGALE MWERU	2186668	0727570421	M	[signature]
17.	CHAKA	2797950	0705490787	M	[signature]
18.	NDARO BEAZAME			M	
19.	JOSEPH TSUMA	2216290		M	[signature]
20.	MAMABO TUNGWA	1095421	90709464447	M	[signature]
21.	Bwaku Beu	2201949	0702774550	M	[signature]
22.	Tuko Nyoda		0727808315	M	
23.	HAMISI M. CHANGOMA	27266655	0742882604	M	[signature]
24.	NGOME Benyame		0705106682	M	[signature]
25.	NYANJE TUNGWA	2094664596		M	
26.	WANJE CHARO	2214826		M	
27.	JIRA .M. MWAKOGA	2201508		M	
28.	ALI MDOE	8435518	0711-525153	M	[signature]
29.					
30.					

VERIFIED BY:.............................. DESIGNATION:.............................. SIGN:................

APPROVED BY:.............................. DESIGNATION:.............................. SIGN:................

Energy | Research | Training | Environment | Community Service

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COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: KASEMENI Date: 03/05/2018 Venue: CHIEF'S CAMP

No.	Name	ID Number	Telephone	Gender	Signature
1.	Ndeme C. Ndeme	14602116	0711254701	M.	
2.	Ndao A. Mangale	2200345		M	
3.	Julo Ndoro			M.	
4.	Emmanuel Chulembi	33522454	0790180512	M	
5.	Yohana Kadzoyo		0736154875	M	
6.	George Rai Nyae	22380372	0706865521	M	
7.	Hendry Taure	10769756	0720322032	M	
8.	Abdallah Mchanjo	2200653	0715332530	M	
9.	Hassan Ngoda	16619514	0723377547	M.	
10.	Mgandi Kaku			M	Kaku
11.	Khamis Nyamawi	2387873	0726243950	M	
12.	Mounjare Akili	3141027	070854596	M	
13.	Saia M Akili	27963044	0713354351	M	
14.	Rumba Masai	0306009	0720697812	M.	
15.	Edward Tune	11600480	0720504124	M	
16.	ALI MZUNGU		0799126419	M	
17.	Elijah Mwandeje		0713166713	M	
18.	WILLIAM MAKOE	13731954	0738149565	M	
19.	Bule Pepande Kubogo		07	M	bule
20.	Karisa Mwandeje			M	
21.	NDANSA GIDEON	12897872	0735748763	M	
22.	MWAKOMBO MAUNDU			M	
23.	SAMUEL BENGAO	20057892	0496776901	M	
24.	John Fundi	35021839		M	
25.	DAUBEN B. WANJE	8409083	0724588197	M	
26.	STANLEY M. MATANO	10955019	0718292353	M	
27.	SAMII G. MNGONGO	0306222	0722362868	M	
28.	GEORGE DEMU	3326932	0725297627	M.	
29.	BEATRICE TUMBO	16020030	0714786438	F	
30.	SAMSON KATANA	1164869	0796 79[illegible]	M	

VERIFIED BY:.................... DESIGNATION:.................... SIGN:..........

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Location: KASEMENI Date: 03/05/2018 Venue: CHIEF'S CAMP.

No.	Name	ID Number	Telephone	Gender	Signature
1.	MASUDI NDEGWA			M	
2.	MBOGA MWAVIJU			M	
3.	EDWARD CHIGUMBA	9627965	0721350149	M	
4.	JOSEPH MZINGA	9626374	0718793459	M	
5.	MWATELA ICAMANZA	5332727	0704538153	M	
6.	JONATHAN JENGELE	4575659	0702869096	M	
7.	MLONGO NDARO			F	
8.	MAGRET T. KADZO	2201957	0704122659	F	
9.	BEATRICE SADI			F	
10.	LINA MGEYU	0688669	0719731155	F	
11.	MARIAM ABDULRAHMAN	14437206	0702407804	F	
12.	MONICA MOMANYI	24654531	0737135371	F	
13.	MLONGO NYAWA			F	
14.	KASICHANA SHANGA			F	
15.	HAMISI MBOYU			M	
16.	NZINGO MWAZUMA			F	
17.	DZAME MWAZUMA			F	
18.	NZINGO MWAMBA			F	
19.	MWAKA CHIKOPHE	0742710244	0742710244	F	
20.	NG'OMBE MGANDI			F	
21.	SHALETTE JONA	28643153	0718672855	F	
22.	PILI MUPA NGAZI			F	
23.	LINA TUKU	0715		F	
24.	LUVUNO MCHANJO		0710185178	F	
25.	CHIPHENYO CHOYU		0719629626	F	
26.	KWEKWE MWANGOLO	25901211	0728140687	F	
27.	SALOME MWENJAR	1887785	0728782990	F	
28.	Zawadi Ali	29851527	0713581280	F	
29.	Judith Ochi	30791599	0740601580	F	
30.	PRISCILLAH MBETSA	14499587	0709983445	F	

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No.	Name	ID Number	Telephone	Gender	Signature
1.	MASUDI NDEGWA			M	
2.	MBOGA MWAVIJU			M	
3.	EDWARD CHIGUMBA	9627965	0721350149	M	
4.	JOSEPH MZINGA	9626374	0718793459	M	
5.	MWATELA ICAMANZA	5332727	0704538153	M	
6.	JONATHAN JENGELE	4575659	0702869096	M	
7.	MLONGO NDARO			F	
8.	MAGRET T. KADZO	2201957	0704122659	F	
9.	BEATRICE SADI			F	
10.	LINA MGEYU	0688669	0719731155	F	
11.	MARIAM ABDULRAHMAN	14437206	0702407804	F	
12.	MONICA MOMANYI	24654531	0737135371	F	
13.	MLONGO NYAWA			F	
14.	KASICHANA SHANGA			F	
15.	HAMISI MBOYU			M	
16.	NZINGO MWAZUMA			F	
17.	DZAME MWAZUMA			F	
18.	NZINGO MWAMBA			F	
19.	MWAKA CHIKOPHE	~~0742710244~~	0742710244	F	
20.	NG'OMBE NGANDI			F	
21.	SHALETTE JONA	28643153	0718672855	F	
22.	PILI MUPA NGAZI			F	
23.	LINA TUKU	~~0~~		F	
24.	LUVUNO MCHANJO		0710185178	F	
25.	CHIPHENYO CHOYU		0719629626	F	
26.	KWEKWE MWANGOLO	25901211	0728140687	F	
27.	SALOME MWENJAR	1887785	0728782990	F	
28.	Zawadi Ali	29851527	0713581280	F	
29.	Judith Uchi	30791599	0740601580	F	
30.	PRISCILLAH MBETSA	14499587	0709983445	F	

VERIFIED BY:..... DESIGNATION:..... SIGN:.....

APPROVED BY:..... DESIGNATION:..... SIGN:.....

MAUNGU LOCATION 08/05/2018 TAUSA DAS

	NAME	TEL. NO.	ID. NO.	SIGNATURE
1	ELISTONE MWAMTUNGU	0726930272	20926430	[signature]
2	Charles Mwangoma	0720100490	2661358	[signature]
3	CATHERINE NYAMBU	0723295076	23778126	[signature]
4	TUKO WARIO	0722628946	9552397	[signature]
5	JAIRUS MUTUKU	0717865791	35055259	[signature]
6	Zachariah Mnyusa	0743608688	36436101	[signature]
7	Ali Ngome Zuma	0715697506	31485095	[signature]
8	NGETI	0712817212	5471076	[signature]
9	Salim Kombo	0720419749	14689318	[signature]
10	ARNOLD NTANGE	0726531199	25517339	[signature]
11	SAIDI MGANDI GODFREY	0706507980	36189583	[signature]
12	JOSEPH MERI	0725553252	2007232	[signature]
13	WILLIAM MWERO MATSO	0711239664	26058240	[signature]
14	NICODEMAS MWARIKI	0720136945	11848569	[signature]
15	JEREMIAH MWANDOE	—	—	[signature]
16	EZEKIEL Mwakulla.	0798542233	31686886	[signature]
17	Idris Mohamed	34491264	0790374931	[signature]
18	Victor mwakulemba	35422322	0746579832	[signature]
19	MARINO MYUMA WONKI	31704010		MWAKIMBO
20	Mgala mgandi	0792035040	3253671	[signature]
21	Lawrence K. KOMBO	0714355655	27083136	[signature]
22	WILSON MWAKORO MAMBO	0715993845	2277987	[signature]
23	KENGO NYAWA	0724192399	13631337	[signature]
24	BERNARD MWAMIDI	0710668126	2252870	[signature]
25	MATHEUS AWILI MNDEKE	0725237997	11655271	[signature]
26	GASPARY MAGHANGA KIBIGO	0706385355	23180991	[signature]
27	HASSAN NJEMO MUGALA	0729656[illegible]	1136[illegible]	[signature]
28	SIMON RWOI	0750525645	27523062	[signature]
29	RAPHAEL MICHAEL	0718094795	29606956	[signature]
30	HENRY NJIRU	0713607667	27355493	[signature]
31	PS Patrick Musyoki	0715861474	21201616	[signature]
32	CHRISPINE M. MSHAM	0727083741	20180252	[signature]
33	DAVIS Mwangemi		22848717	[signature]

CHIEF MURUNGU LOCATION

	NAME	TEL. NO.	ID. NO.	SIGN
34	MAZERA MKALA	0727569980	22694249	[illegible]
35	MGANDI KAINGU	0715595970	26041722	[illegible]
36	Chambeyo Kuingu	0773338171	53333151	Cetw.
37	LIVINGSTONE MACHANGA	0702905219	22558866	[illegible]
38	Khadija Mwandaro	0718296254	25473395	[illegible]
39	Chizi Lugwe		16029942	[illegible]
40	Kazungu Mwandeje	0739[illegible]	11655936	[illegible]
41	Kasii Musili	0721750645	28030793	[illegible]
42	Rashid Mbuja	0716492051	34670794	[illegible]
43	Mwaganjon Mwondele	0791053814	20285351	[illegible]
44	Elija ngati	0726238670	5383168	[illegible]
45	JOSEPH MACHAUCHAU	0717828[illegible]	2276700[illegible]	[illegible]
46	Mangamso Amon	0797009[illegible]	13631155	[illegible]
47	BONIFACE MWACHUNGA	071680[illegible]1	20492871	[illegible]
48	IGNANCE MNJAU	0710727524	29028019	[illegible]
49	MAHMOUD MOHAMED	0720318263	22433536	[illegible]
50	PENINA KWEKWE	0790337317	31667823	PENI
51	MAUHA BATI			
52	NRALA SIMON	[illegible]537578		
53	Mohamed Mwaega	071[illegible]84[illegible]	29716228	[illegible]
54	RIALIA IBRAHIM	072261600[illegible]	0722016004	
55	JOYCE MNGOLA	079703[illegible]		
56	Agneta Kassim	0703151143	34396204	Constance
57	ELISTINAH NZIGHE MELE	0742708[illegible]	25475864	[illegible]
58	Donald Ngala	0742138997	23178092	[illegible]
59	Amon Mwapagho	07165[illegible]	27334326	[illegible]
60	Fraidsen Chondo	0703287[illegible]	28638751	[illegible]
61	JOSEPH MALAU	0724475[illegible]	2991[illegible]11	[illegible]
62	Musonya Muthoka	0712626720	2361521	[illegible]
63	Ndoro Nyanda	[illegible]	[illegible]	[illegible]
64	ABDUL KADENGE	0728 754164	27266978	[illegible]
65	NGUDO DADI	- - - -	5422464	G U 20
66	RASHIDI MASUDI	0727745[illegible]	31058426	[illegible]

	NAME	TEL. NO.	ID. NO	SIGNATURE
34	JASPED WATEE	0728691394	0969209	[signature]
35	FADHILI KUIDA	0796119211	16016460	[signature]
36	FRANCIS MAGHANGA	0722902505	8456107	[signature]
37	Asha Luguse	0708544128	27085351	[signature]
38	Deffence BARISH	0712552888	16151127	[signature]
39	JERUSHA JAMES	0712255332	20316076	[signature]
40	Emmaline Ng'endo	0703499540	26903290	[signature]
41	Leah Pator	0792249901	31052297	[signature]
42	Luvuno Kaingu			L.K.
43	Edward Katheya	0726657452	22335709	[signature]
44	WAMBUA MUUTU	0732523536	20280132	[signature]
45	Gaduna Nbuqe			
46	Wari.o BASHORA	0795092438		[signature]
47	LUCAS M. Mwakiadha.	0707144807	21265392	[signature]
48.	ABDI.G. DUB.		31642069	ABDI.GASA.
49.	ABAJILA. BORU.	0799805865	28516024	[signature]
50	ZAINABU HASSAN		28599979	[signature]
51	MWANJOLA DUTI		31430933	[signature]
52	JOSEPH W. MWAZOW	07088547.2	3082411	[signature]
53	DOROTIA MWAMIO	0776756848	26346061	[signature]
54	Julius Mwandarir	0720605239	0961670	[signature]
55	Mohammed Chimunga	0743598941	32840962	[signature]
56	LeoNandi Kamau	0710286681	28608023	[signature]
57	VIVIANE SONGOK	0717005805	20289662	[signature]
58	RODGERS KILAWA	0724408108	32088000	[signature]
57	TOPISTAR MAKURA	0725975338	23850844	[signature]
60	JOSHUA MASAI	0723428493	11572289	[signature]
60	MANHALE MUNDA	0707676230	24370044	[signature]
62	Getrude Ngele Mavikamba	07		[signature]
63	Loice mwende mwania	0713635993	13485398	[signature]
64	CHRISTINE MUTIE	0700637344	1326901[illegible]	[signature]
65	Purity-N. Ndila	0724758157	12717092	[signature]
66	HASSAN YAKA MANGALE	0702061346	1365125	[signature]

(67)	SALIM MKALA MWERO	0708804681	34778129	
68	ROSE MACHOCHO	0724715405	20155407	
69	OMAR MWABANA	0775159950	26677686	
70	REHEMA GOME KAINGU	0701561845	36426625	
71	SALMA MGANDI		13823863	
72	UMAZI KAINGU	0795389307	27121534	
73	Lucian Mwakisenge	0753241868	4582237	
74	Jacline Mgwambi	0713622525	23880639	
75	Sylvia Achia	0746776295	34777540	
76	Loice Wanyika	0712753237	26035896	
77	Grace Komani	0722152329	24802299	
78	MIRIAM N SAFUKU	0728902181	10321816 MINOR	
79	Hebron Mwangharanga	0712025971	22946418	
80	JOHN KAVENZO	0716750215	10397247	

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COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: MBOLOLO Date: 08/05/13 Venue: TAUSA-DAIS

No.	Name	ID Number	Telephone	Gender	Signature
1.	TUKA WARIO	9558397	0722628944	M	[illegible]
2.	AKUIRI K KENNETH		0739364264	M	K.A.K
3.	N.M. NGETI	0184690	0727684231	M	[illegible]
4.	DELPHINA M. NYANGE	11655105	0728679090	F	[illegible]
5.	GODFREY F. MWAMBA (Hon	2215424	0722245070	M	[illegible]
6.	NATHAN MCHARO	0464172	0712690576	M	[illegible]
7.	NATHAN MWANDOO	4654292	—	M	[illegible]
8.	WALTER M WEMBUR	12268612	0716713372	M	[illegible]
9.	DOUGLAS MWACHIA	22144949	0707639594	M	[illegible]
10.	JONATHAN M MJOMBA	13663295	0729317581	M	[illegible]
11.	Elias		0705167797	M	[illegible]
12.	William Mwarigha				
13.	JOHN MWALUNGWA	3457519	0718526914	M	[illegible]
14.	JASIEL MWAZIGHA	89227504	0703106972	M	[illegible]
15.	ERASTUS SHARIA	2975964	0729351511	M	[illegible]
16.	JOSEPH MWAMSIDU	11870226	0710689387	M	[illegible]
17.	JASON MWAMSHUNDA	10578190	0780853138	M	[illegible]
18.	JOHN MWABILI	23269795	0775210064		[illegible]
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VERIFIED BY: N.M. NGETI DESIGNATION: Chief SIGN: [illegible]

APPROVED BY:.................... DESIGNATION:.................... SIGN:

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CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE.

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: MBOLOLO Date: 08/05/2018 Venue: TAUSA ... DIAS

No.	Name	ID Number	Telephone	Gender	Signature
1.	AGATHA KAZI	11061033		F	
2.	MARIA mwakela		0718006667	F	
3.	Christin Maghanga	9983149	0708334315	F	
4.	CAROLINE MWAKIO	10395799	0716417630	f	
5.	CATHARINE MWASI	11654925	0706654384	f	
6.	ELIZA MWAKIMA	13268588	0716443961	f	
7.	Dorina MAGHANGA	16022623		f	
8.	Jane wughanga		0705227176	f	
9.	JACKLINE MAKENA	30426662	0740080145	f	
10.	UNICE KAHAM		0713879596	f	
11.	ESMILLY MANG	9983146	0741080145	f	
12.	EMILLY MLIWA	16014949	0726855511	f	
13.	GRACE MWAPWANA		0795854257	f	
14.	Christine Mganga	13269721	0707385980	f	
15.	JAEL MWACHIA	21283309	0716083589	F	
16.	JANET MWATEMBO	16057617	0703503111	F	
17.	Edna Mkamba	16044900	0710767845	F	
18.	SCOLLAR W KISHOSHI	[illegible]	0710296573		
19.	Prisca Mwangolo		0716566371	F	
20.	JARDINE MWATTA		0726153623	F	
21.	Martha Mwangura	3342297	0712053345	F	
22.	UMA ZINDONGA	21754128	0704352117	F	
23.					
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VERIFIED BY: N.M. NC DESIGNATION: Chief SIGN:

APPROVED BY:................................ DESIGNATION:................................ SIGN:

OFFICE OF THE PRESIDENT CHIEF MBOLOLO LOCATION Community Service Date ... P.O. Box ...

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COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: MBOLOLO Date: 08/05/18 Venue: TAUSA DAIS

No.	Name	ID Number	Telephone	Gender	Signature
1.	FAISAL [illegible]	22621166	07351477	M	[illegible]
2.	JAPHET MWASIGHO	2246001	0724428686	M	[illegible]
3.	RODGERS NYANGE	0308822	0724264517	M.	[illegible]
4.	OLIVER MWALWANDU	6404810	0721225242	M	[illegible]
5.	GILBERT MWAMBALA	0501011	0728826064	M	[illegible]
6.	Vilet Righa	16026190	0708059105	F	[illegible]
7.	margret wali	0154969	0714577372	F	Margaret
8.	JOHNSON MWALUMA	16000734	0726719315	M	[illegible]
9.	Jane Nyambu			F	Jn
10.	MARY MWAKIA	5380802	0703130170	F	Mary
11.	HOLINESS NGELE	9786533	0713592533	F	Holiness
12.	Simon mkamba	16618571	0707562202	M	[illegible]
13.	GIBSON MWAKIO	5473122	0720966577	M	[illegible]
14.	MILTON MBOGHOLI	10789238	0721893742	M	MG
15.	SYLVESTER Magolia	9983128	0708562085	M	[illegible]
16.	MWAKUTO MWADIA	1361141	0716912639	M	[illegible]
17.	Stephen Musiwawi	5401683	0700551683	M	[illegible]
18.	ARMOGAST MACHILA	8459319	0731937080	M	[illegible]
19.	Oliver Rockleaf Mwalee	0085096	0726821324	M	[illegible]
20.	Samuel Mwawange	8954596	0721652453	M	[illegible]
21.	Laban Mmbololo	0358632	0711593270	M	[illegible]
22.	WILSON MWADIME	9010564	0727552510	M	[illegible]
23.	PETER TIMWAWASI	2262670	0706158952	M	[illegible]
24.	AMBROSE MWANGEMBE	14511392	0703958599	M	Ambrose.
25.	Ronald Jumwa		07945149	M	[illegible]
26.	Edward Shungula	9319501	0704523471	S	[illegible]
27.	Paul Mbinga		0728670564		[illegible]
28.	Silvano Mwawisua	31705698	—	M	[illegible]
29.	NICODEMUS MWANGOYA	8460222	0728703336	M	[illegible]
30.	NOEL MWAGHA	22992851	0713956193	M	[illegible]

VERIFIED BY: N. M. NGETI DESIGNATION: Chief SIGN: [illegible]

APPROVED BY:.................. DESIGNATION:.................. SIGN:..........

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COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: MBOLOLO Date: 08/05/2018 Venue: TAUSA DAYS

No.	Name	ID Number	Telephone	Gender	Signature
1.	Fanuel Mwanmuka	8954596	0721652455	M	[signature]
2.	Laban Mwabenako	0358632	0711593270	M	[signature]
3.	Patrick Mwalvuma	13822895	0721226875	M	[signature]
4.	Mwakazi ngoto	03063324	0700364936	m	[signature]
5.	Elias Mwanyesi	20115220	0171511140	m	[signature]
6.	Jeremiah Mwarigha				[signature]
7.	JOSEPH M. MWALUMAO	13271289	0720892608	M	[signature]
8.	PATRICK M. MWAKITAWA	16022685	0722480214	M.	[signature]
9.	ERNEST MWALUNGWA	11869086	0721613677	M.	[signature]
10.	Godwin Shali	0776556	0726792560	G	[signature]
11.	JACKSON MWAWUGHANGA	0819108	0719431710	M	[signature]
12.	MWAKITI M. MAKONGO	2243240	—	M	[signature]
13.	RAPHAEL KITINGWA	5320389	0711924601	M	[signature]
14.	Gibson Jacob				[signature]
15.	Timothy Mwongeke	5395055	0721316378	M	[signature]
16.	Reuben Mwashigadi	8353204	0741487848	M	[signature]
17.	Simon mdingo	5384669	0718793636	M	[signature]
18.	Gilard Mwambai			M	[signature]
19.	EDWARD K. MAGANGA	2250014	—	M.	[signature]
20.	MSILA MWENO MA ATMO	2292409	0718886455	MUSELA	
21.	Stephen Mwatembo	2214518	0759306315	M	[signature]
22.	HARRISON M. MWAMBUA	10735382776	0711554717	M	[signature]
23.	RODGERS M TANDBO	0715574297			[signature]
24.	ELIPHSTONE M. MKALA	0723864577	3915084	M	[signature]
25.	BENSON MAPISHA	13417594	0720946397	M	[signature]
26.	FELIX M'MBOLOLO	9079657	0722649167	M	[signature]
27.	GEORGE MWANYALO	2654821	0724587796	M	[signature]
28.	DUNCAN MWALINA	0563022	0735936445	M	[signature]
29.	DAVIS.M.MWAMBONYI	5319419			[signature]
30.	TONY MNJALA	3377136	0729576281		

VERIFIED BY: N. M. NDWEH DESIGNATION: Chief SIGN: [signature]

APPROVED BY: .... DESIGNATION: .... SIGN: ....

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COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: MBALALA. Date: 08/05/2018 Venue: TAUSA DIAS

No.	Name	ID Number	Telephone	Gender	Signature
1.	Joy Wasirimba	24700920	0713932121	F	
2.	Hiram Gacinah	23971844	0725049400	M	
3.	GRACE S MSHIMBA	0154845	0719339799	F	
4.	VULANCE MWAMBEU	5405448	0711960517	F	
5.	ELINA W. NUNA	03068 05	-	F	
6.	ESTHER MWATIBO	11651161	0722903273	F	
7.	Anne Mwambui	29660653	0707662224	F	
8.	Phidlora Mgai	16121820	0723348 62	F	
9.	Martha Mshimba	9983163	0717876993	F	
10.	Margaret Kiasi	16020136	0719359257		
11.	LUCY M MUESI	3161057			
12.	JANET KISHOSHO	4609626	1454		
13.	PURITY KALIMA	22703329	0714482663	F	
14.	GLADYS MWENDA	30141739	0702613137	F.	G.M
15.	FIBI S MWANGITA	6705171	0726997028	F.	
16.	PERIS MWAMBURI	11614982	0724536102	F	
17.	Phillisicah Mbaamyemba	16020662	0726275537	F	
18.	Rachel W. Mbula	2272350	-	F	
19.	Maggie M Mbula	29467422	0705554862	F	Maggie
20.	Agnes Mwajalo	13016671	-	F	
21.	Suzzie Mwachari	11313073	0705550442	F	
22.	Hope Mwajalo	24590730	0712009539	F	
23.	Marita Mwachari	16043919	0726256935		
24.	AGATHA RUMA	10397721	0710582706	F	
25.	JENNIFER WALOWE	16044978	0704145 96	F	
26.	ZAROZIN MASAMBO	9786769	0798554624	F	
27.	MARGARET KAMBU	10754521	0723041657	F	
28.	Gladys Mwemba				
29.	Mercy Mwangondi	16110675	0720	F	M.M.
30.	Loise A Mwachofi		0705 8702	F	L.M.

VERIFIED BY: J. IMI. NGETH DESIGNATION: Chief SIGN:

APPROVED BY: DESIGNATION: SIGN:

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COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: MWATATE Date: 03/04/2018 Venue: KAFUMBU A''

No.	Name	ID Number	Telephone	Gender	Signature
1.	KATAMA MANGALE	22621534	0702500676	MALE	
2.	CHANDO DZINGA	23942923	0729021624	MALE	
3.	NYAMAWI MBUCHE	B630614	0725236432	MALE	
4.	NDILO CHIZAMA	2186092	0725702092	MALE	
5.	KATANA CHANDO	2157966	0725919389	MALE	
6.	NDENGE MGALA	11377195	0708230773	MALE	
7.	KAZUNGU RAJABU	4611634	0795602624	MALE	
8.	TITUS N MWATSAHU	14436362	0715503553	MALE	
9.	MGANDI MBOVU	27456446	0799191606	MALE	
10.	JOHN NYAMAWI	32175655	N/A	MALE	
11.	CHEMBE MWANONGO	22953042	0713669802	MALE	
12.	AHMED NDEGWA	13851926	0748696491	MALE	
13.	MEJUMAA JUMA	30011372	0715167192	FEMALE	
14.	KAITINDI MWINGI	N/A	N/A	FEMALE	
15.	KEA MKALA	SA29024	N/A	MALE	
16.	MWYAZI KUZA	N/A	N/A	FEMALE	
17.	Reuben ISUMA	0464342	0702299161	MALE	
18.	VANZE MANGALE	N/A	0726669782	FEMALE	
19.	Kadoti NDORO	28723762	0714101254	MALE	
20.	UMAZI RUKIA	29[illegible]1782	0719425155	FEMALE	
21.	ASHA KUCHUKHE	31215623	0796616382	FEMALE	
22.	HADIJA BINTI MGANDA	N/A	0706052059	FEMALE	
23.	BAYA MWANZATA	22258110	0713178953	MALE	
24.	ELIUD CHIRUNGA	9771258	0728489[illegible]	MALE	
25.	ABDALLA RAMBO	5D1L608	0720491276	MALE	
26.	STEVEN MBUZA	1012963	0726599943	MALE	
27.	PATRICK MBUDZYA	24862185	0705382458	Male	
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CHIEF MWATATE LOCATION

VERIFIED BY: Samson Chale DESIGNATION: ..... SIGN: .....

APPROVED BY: ..... DESIGNATION: ..... SIGN: .....

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COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: Mwatumba Date: 03/05/2018 Venue: Kololoni chiefs camp

No.	Name	ID Number	Telephone	Gender	Signature
1.	OMARI DIYE KUMBO	4610407	0707471264	M	[signature]
2.	AJHA KARANI MERI	11243216	0724424873	F	[signature]
3.	MWANAMA Abdall manga	14493297	0726683075		[signature]
4.	mupa munga				
5.	ZAMA BENDEGWA				
6.	HASSAN M MENZA	21774422	0721142824	M	[signature]
7.	Rose Kavemba mwangolo	5016750	0721153969	F	[signature]
8.	Dickson Fune Mawa	8400706		M	[signature]
9.	Uchi Chiraph Nyawa	8217488		F	Uchic
10.	MBao Mgandi	.	0712647855	M	[signature]
11.	Futuma Uchi Nyamawi	31206332	0714853632	F	[signature]
12.	CHOMEWABASHA	2152262	0726631740	M.	[signature]
13.	ZUBEDA C. MERI	22607897	0712908340	F	[signature]
14.	MBALAZI GONDA				
15.	JOSEPHINE C CHAM	27647396	0702245445	F	[signature]
16.	MWANJOLE N. NDORO	1443619 6	0723853626	M	[signature]
17.	Solomon K. DALLU	11244813	0715280300	M	[signature]
18.	HAMISI O. NZOMO	2176149	0712503813	M	[signature]
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VERIFIED BY: Solomon K. DALLU DESIGNATION: CHIEF SIGN: [signature]

APPROVED BY:............ DESIGNATION:............ SIGN:............

SOLOMON K. DALLU
MWAVUMBO
CHIEF
DATE 11.5.2018

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COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: Mwamba... Date: 03/05/2018... Venue: Kaloleni Social Hall

No.	Name	ID Number	Telephone	Gender	Signature
1.	PITA gona Chero	3[illegible]515007	0796777780		[signature]
2.	JOHCE MERZA	9771297	0708294801		[signature]
3.	LUVUNO NYOTA	9770926	0720885815		[signature]
4.	TABU MKONYO	21102410	0729887986		TABU
5.	JOHN MWARURA RUA	2193636	0701590640		[signature]
6.	NGALA MULET				
7.	Robert Mgandi MBOVU	29203634	070844094		[signature]
8.	Chizi Chupi NGuta	23969732	0724542836		[signature]
9.	Chizi Mwuryi Dele	460349	0705180910		[signature]
10.	Uchi Mwatsahu Jum	3557628			[signature]
11.	Hamisi Mwatsahu Juma	13837929	0721945036		[signature]
12.	TSYOKAU MKONYO	5424184	—		[signature]
13.	Chamtu Mbovu	30235089	0712971473		[signature]
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VERIFIED BY: Solomon K. Dali DESIGNATION: CHIEF SIGN: [signature]

APPROVED BY:.................... DESIGNATION:.................... SIGNATURE........

SOLOMON K. DALI
Chief MWAVUMBO
LOCATION
DATE Community Service

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COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: MWAVUMBO Date: 03/05/2018 Venue: KALALANI SOCIAL HALL

No.	Name	ID Number	Telephone	Gender	Signature
1.	STEPHEN CHENGO LUBANDO	26939590	0729974082	MALE	[signature]
2.	CHENGO DZIWO	20860444	0791264662	MALE	[signature]
3.	CHARO BAMBO	24743358	0717655002	M	[signature]
4.	JOSEPH · M · CHUTI	22634596	0721209137	M	[signature]
5.	~~[illegible]~~		~~[illegible]~~	~~M~~	[signature]
6.	SALIM M. KAKONGO	21776418	0702068504	M.	[signature]
7.	CHARO BAKA KALUME	26949476	0700304836	M	[signature]
8.	NGOWA NYONDO CHIPWA	2217909	0715047681	M.	X X X
9.	RAMADHAN M. KAKONGO	21232585	0742900610	M.	[signature]
10.	ZAINAB S. KOMBO	11601071	0721664784	F	X X X
11.	Mzungu Chimera Hongoro	27278154	0795974700	M	[signature]
12.	UMAZI OMARI BEYAMO 0217666			F	
13.	NDARO MWAMBA	25936668	0724373509	M	[signature]
14.	CHIZIGWA NYIRO	4574619	0704713880	M	[signature]
15.	NZALAMBI JOSEPH.	12489068	0702926006	M.	[signature]
16.	MLONGO KAKONGO	14491575	0719674669	F	[signature]
17.	NDEGWA STEPHEN CHARO	23422906	0787587672	M	[signature]
18.	MWACHIPUPU KARISA	25698474	0708945836	M.	[signature]
19.	RAMA K GUBE	28888861	0712191553	M	[signature]
20.	KIMERA HINZANO	0660297		M	X X X
21.	KHAMISI JIRA	2256218	0727242373	M	X X X X
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

VERIFIED BY: Solomon K. Dhallu DESIGNATION: CHIEF SIGN: [signature]

APPROVED BY:................................ DESIGNATION:................................ SIGN:................

SOLOMON K. DHALLU CHIEF MWAVUMBO LOCATION DATE 11.5.2018 Community Service

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FRANCIS ALLEN CONSULTING

CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE.

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: Mwavumbo Date: 03/05/2018 Venue: Kaloloni Social Hall

No.	Name	ID Number	Telephone	Gender	Signature
*1.	JUMA MNDALU KALUMA	9232336	0740395066		[illegible]
2.	PARSCAL C. CHANGO	1-2228218	0724777317		[illegible]
3.	ROCHA HINZANO	21380362	0742902835		[illegible]
4.	JUSTUS CHENGO NYAWA	4991006	0728826451		[illegible]
5.	CHANGONGWE MGUNYA	3167052	0701313902		[illegible]
6.	JONNI MANGALE	1168339	0700488563		[illegible]
7.	CYRUS KOMBO	9395267	0729589769	M	[illegible]
8.	CHUTI MWIEU	5017800	0788665764	M	CHUTI
9.	MORRIS MWALIMU	9771247	0725489427	'8	[illegible]
10.	JACKSON CHOME	9771236	0719533837	M	[illegible]
11.	ATHUMAN MSHENGA BASHA	2475 3954	0727491580	M	[illegible]
12.	CRISTINA KWISHA LUBASI	7958629	0707882953		[illegible]
13.	MJAVULA CHARO	2196192	-		[illegible]
14.	Mjeni Mosa		0796319383		[illegible]
15.	Asha Kazungu	29220650	0704977448		[illegible]
16.	MOHAMED DALU MVULI		9771290		[illegible]
17.	KADZINGO K. MTUAWA	13487052	0729039804		[illegible]
18.	Moses Hunzeno	9771326	0712679141		[illegible]
19.	Chale Mrina	27277901	0710482445	M	[illegible]
20.	Manenzale Tsanefari	8373156	0700721981	M	[illegible]
21.	Jane P Umazi Mgandi	33449711	0729455741	F	[illegible]
22.	Fatuma Bibi Bati	34403907	0795440451	F	
23.	Kahaso Kengo			F	
24.	Dzame Bendegwa	24313309		F	
25.	MADALU BONDO	8232116			[illegible]
26.	Kanze Chigulu	30985758			[illegible]
27.	SARAJI NZOMBO	3219408			[illegible]
28.	Mgeund. KadzingD	9187492	0727892726		[illegible]
29.					
30.					

VERIFIED BY: Solomon K. Dallu DESIGNATION: CHIEF SIGN:

APPROVED BY:................ DESIGNATION:................ SIGN:

SOLOMON K. DALLU
CHIEF MWAVUMBO LOCATION
DATE: ...

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CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE.

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: Ngolia Date:…………………… Venue:……………………………

No.	Name	ID Number	Telephone	Gender	Signature
1.	Joram M Mwazo	8460180	0716133124	Elder/M	[signature]
2.	Philip Maraani	0451871	0728684024	M	[signature]
3.	Zephaniah R. Luwuah	051253	0704768551	M	[signature]
4.	Michael M Mmbori	23414652	0729072848	M	[signature]
5.	Preston Murari	16022878	0743464404	M	[signature]
6.	Leonard M. Mbogho	6686297	0797732419	M	[signature]
7.	Suleman. M. Mwaluli	14511377	0711232450	M.	[signature]
8.	Hezekiah Lunbi	35715348	0792646804	M	[signature]
9.	Betty Mwachonzo	7795199	0703419510	M	[signature]
10.	Mwachala Lwanshone	2069523	0720882943	M	[signature]
11.	Maria Kaoya	1122046	0706551552	M	[signature]
12.	Elius Mwamcesi	11312220	0796270154	M	[signature]
13.	Joseph Mwamasari				
14.	Arnest Mwakina	9319346	0705647511	M	[signature]
15.	Luka Mwambale			M	[signature]
16.	Samuel Ngari	0152214	0797337856	M	[signature]
17.	Reuben M. Ngara	16077877	0722731824	M	[signature]
18.	Lawrence Nwangembe	9010874	0722814612	M	[signature]
19.	Jennifer M. Nguwa	4654390	0726783769	M	[signature]
20.	Marta Musalendi	16115840	0715082141	M	[signature]
21.	Ada Mwashimba	14412409	0723949181	F	[signature]
22.	Nancy Shangalla	16028693	—	F	[signature]
23.	Dorah Madanga	9079634	0712200668	F	[signature]
24.	Eunice Manga	8456366	0702651812	F	[signature]
25.	Elfrida Matasa	5463672	0795624142	F	[signature]
26.	Vigilance Mwasi	22490525	0799741334	F	[signature]
27.	Florence Mwakudu	34649730	0713039824	F	[signature]
28.	Martha Ndosi		0797314085	F	[signature]
29.	Florence Mwasaura	2866120	-	F	[signature]
30.	Zillah Mwakao	20911484	0712399789	F	[signature]

VERIFIED BY: EZEKIEL MBOE DESIGNATION: SENIOR ASST. CHIEF SIGN: [signature]

APPROVED BY:……………………… DESIGNATION:……………………… SIGN:………………

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NGOLIA LOCATION P.O. BOX KITIVO VIA VOI DATE: 8/5/2018

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FRANCIS ALLEN CONSULTING

CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE.

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: Ngolia Date:........ Venue:........

No.	Name	ID Number	Telephone	Gender	Signature
1.	DENHAM MWABIALA	13636615	0719581437	M	[signature]
2.	Michael Mwadulo	30021024		M	[signature]
3.	EZREL MGAAGA	12546906	0798620386	M	[signature]
4.	JACOB MWACHONDO	26647680	0702868940	M	[signature]
5.	JOSELYN MWAKIFU	29732618	0746185156	M	[signature]
6.	MSAGHA NGOLO	1322441	—	M	[signature]
7.	BRIAN M MJOMBA	22636017	0738536809	M	[signature]
8.	WELLINGTONE MWANGIBWA	26386011		M	[signature]
9.	JOSPHAT MWAKITIII	10759321			
10.	FREDRICK MWAKESI	23569147	0798027929	M	[signature]
11.	Ambrose Mwadime	10395712	0719287818	M	[signature]
12.	Michael Mwalembe	13270336	0703113446	M	[signature]
13.	Reuben Mbogho	0166365	—	M	[signature]
14.	MWAKESI MWAWASI	10395326	0791471579	M	[signature]
15.	DARIUS MWAWANDA	24606265	0706005770	M	[signature]
16.	DAVIES MAFAO	13280176	0728756722	M	[signature]
17.	DUNCAN MWAMBISHA	2466929	0778189298		[signature]
18.	JOSEPH WAWAKA	11313479	0716473614	M	[signature]
19.	STEPHEN MSINGA	22828491	0711747428	M	[signature]
20.	ALLAN MKOJI	0516152	0724350054	M	[signature]
21.	LEONARD MUSA	23263438	0722170398	M	[signature]
22.	DUNCAN MCHAWA	2128692	0715721783	M	[signature]
23.	DAVIES MWAZO	3465729	071434[illegible]	M	[signature]
24.	ALLAN MNGODA	4654078	0722351362	M	[signature]
25.	Johnson mwamumi	23014468	0714765742	M	[signature]
26.	Hassan C Luwali	27024737	0701660359	M	[signature]
27.	JOSEPH MWAWIMA	22126042	0746524466	M	[signature]
28.	ROSE MILURA	20752858	0728829433	M	[signature]
29.	GILBERT MGHANGA	10397413	0717121619	M	[signature]
30.	MWANIDAWIRO MWAWISHA	0722809010			

VERIFIED BY: EZEKIEL MDOE DESIGNATION: SENIOR ASST. CHIEF II SIGN: [signature]

APPROVED BY:.............. DESIGNATION:.............. SIGN:..............

CHIEF, NGOLIA LOCATION, P.O. BOX VOI, VIA KITIVO, DATE: 9/4/18

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FRANCIS ALLEN CONSULTING

CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE.

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: Ngolia Date:........................ Venue:.................................

No.	Name	ID Number	Telephone	Gender	Signature
1.	BENSON MWAMBOGHA	10058955	0710612437	M	[signature]
2.	WILSON MCHANA	8385254	0725481067	M	[signature]
3.	DAVIES MWANDIGA	0150770	0711402793	M	DM
4.	FANWEL M. MGANGA	0660783	0707808213	M.	[signature]
5.	ANTHONY MWASHUMBE	3504429	0720397005	M	[signature]
6.	LUCAS MWADEMA	3883858	0727806600	M.	[signature]
7.	DICKSON MWAVISWA	4848949	0704768203	M	[signature]
8.	GERALD MAGHANGA	22701499	0728781436	M	[signature]
9.	ROSE MWADENA	12546877	0704935918	F.	[signature]
10.	DANSON MWACHIGHADI			M	DANSON
11.	MARTHA MGANGA	1131082	0724806761	F	[signature]
12.	ROPHENCE MSAGHA	3007966	0771355115	F	RD
13.	CLEMENCE M KIWAI	13271506	0721200575	F	[signature]
14.	Agines Chao	01605603	0770105566	F	A.C.
15.	Eunah Mghanga	16027605		F	E.M
16.	PERIS MWAVISWA	16092280	0740069325	F	PERIS
17.	JULIU TULU	2962433	0706292342	M	ZULU
18.	ELISHA MKIANYALO	20122162	0712497738	M.	[signature]
19.	Mbogho MKALA	20122162	074522819	M.	[signature]
20.	NORMAN MWANGEMI	21564086	07540066	M	[signature]
21.	CHRISPUS MWAKESI	21938316	0711760813	M	[signature]
22.	MWAMADI Shimbu	11869032	0790898461	M	[signature]
23.	JACL W JOSEPH	21285525	0718006687	[illegible]	[signature]
24.	MOSES. M. MWANGIMA	8/3/2018 0721384041	0721384041	M	[signature]
25.	MICHAEL MWENDO		0747481913	M	[signature]
26.	AGGREY P. MBOGHO	2242748	0728125142	M	[signature]
27.	GETRUDE MWANDOO	11868964	0713519864	F	GM
28.	FLORENCE MWASIGWA		0708184713	F	JM
29.	Fregence Mbogha	16014599	0721674208	F	[signature]
30.	PHILESS NZUKI			F	Philes

VERIFIED BY: EZEKIEL NDALE DESIGNATION: SENIOR ASST. CHIEF II SIGN: [signature]

APPROVED BY:................................ DESIGNATION:.. SIGN:...............

CHIEF LOCATION KITIVO NGOLIA P.O. BOX VIA VOI DATE: 8/5/2018

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CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE.

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: Ngolia Date:………… Venue:…………

No.	Name	ID Number	Telephone	Gender	Signature
1.	EDWARD MWALUHOPA		0725485320	Male	[illegible]
2.	GIBSON MANGOPE		0726365794	male	[illegible]
3.	Philip T. Changallo	3932878	0723266476	M	[illegible]
4.	ERic Mwandaga	0660681	07016651	M	[illegible]
5.	Peter Mwachonga	10759405	0726855546	M	[illegible]
6.	Amos M Mgenyi	0464488	0736649947	M.	[illegible]
7.	AUDREY SHANGALA	10716225	0712733631	m	[illegible]
8.	MAGGIE MWAMEGO	9786789	0715172549	m	[illegible]
9.	Nowel Ngeta	[illegible]	Malube	M	[illegible]
10.	Beatrice Mwangombe Mwawasi	14511409	0796377607	Malupe	[illegible]
11.	Linet Mwawanga	16016004	0791270830	Malupe	[illegible]
12.	Johnson Kirigo	0160356	0704497560	Salaita	[illegible]
13.	AMBROSE MWANYOMBA	07166013	ID) 8946570	MALE	[illegible]
14.	NELSON M. NYANGE	4989573	0712569145	M	[illegible]
15.	PHEMY KIBAMA	13375098	0737575478	F	[illegible]
16.	ADDA KINIOI	8457304	0727768755	F	EKwua
17.	DIANA MKAMBURI	16038/42	0707063709	F	Dian
18.	Gladwell Mwalimu	4642340	0726227668	F	[illegible]
19.	Mary Mbogo	858341	07262748	F	Mbogo
20.	Rose Mwakoma.	31283116	–	F.	R. m.
21.	Gracelda Mwemba	13056832	0716231809	F.	[illegible]
22.	Agnes Mbogha			F	
23.	ChepKemoi mwanjala	20193835	0708935983	F	[illegible]
24.	Paruti Shambai			F	
25.	Denica Mwakio	16019003		F	[illegible]
26.	Michael Alabi	20177640		M	
27.	MARTIN MWAKIM	13623476		M	
28.	Arnold Mwachala	27170662		M	[illegible]
29.	Jones Msinga	16019288	0700157082	M	[illegible]
30.	[illegible]	8372584	0726816310	[illegible]	[illegible]

VERIFIED BY: EZEKIEL NDOO DESIGNATION: SENIOR ASST. CHIEF II SIGN: [illegible]

APPROVED BY:………… DESIGNATION:………… SIGN:…………

CHIEF: LOCATION NGOLIA P.O. BOX KITIVO VIA VOI DATE: 8/5/2018

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FRANCIS ALLEN CONSULTING

CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE.

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: Samburu Date: 03/05/2018 Venue: Samburu Chief Camp

No.	Name	ID Number	Telephone	Gender	Signature
1.	ZAINAB MLONGO MWATHUI	31669251		F	[signature]
2.	MBODZE BEMBETU	6TK808		F	[signature]
3.	KWEKWE NJAWA	4621978		F	[signature]
4.	SHANGA NDEGWA	4621091		M	[signature]
5.	MARIAM MJENI	31758711		F	[signature]
6.	AMINA MNYAZI LELI	29518746		F	[signature]
7.	SAIDI NZANGE	27897711		F	[signature]
8.	CHIZI CHAKA	6723796		F	[signature]
9.	FATUMA RAJAB HAZIW	22426571		F	[signature]
10.	DELE MVURYA	8417445		M	[signature]
11.	NTAMAWI MWAMKONDO	4651199		M	[signature]
12.	CHIZI CHAKA BENDZIRO	6723796		F	[signature]
13.	NJAWA NDORO			M	
14.	NWERO NJOWA	11772257		M	
15.	SALAMA TABIA	21153337		F	
16.	ZAWABI NDORO	23400989		F	
17.	NJAE NGUDO	20445144		M	
18.	WILFRED CHIMANGA	0150504		M	
19.	SELINA JOSEPH	14598013		F	
20.	MWANAJUMA JOTO	36575011		F	
21.	NZARA CHUPHI	N/A		F	
22.	ALICE DZINO	20292606		F	
23.	CHIZI NZAPHILA	27362068		F	
24.	SAUMU MWENDA	27867022		F	
25.	MWANDURYA GONDI		0726444323	M	
26.	PETER KAZO	13447569		M	
27.	NADHUA NTAMAWI	8399209		F	
28.	DZAME MBUJA	N/A		F	
29.	MASIKA CHAJENGE	N/A		F	
30.	NJIRA NZANJE	32378515		F	

VERIFIED BY: Mundu Chilemba DESIGNATION: SNR CHIEF SIGN: [signature]

APPROVED BY:.................... DESIGNATION:.................... SIGN:....

SNR. CHIEF MUNDU SAMBURU LOCATION 3/5/2018

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CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE.

Samburu

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location:.................. Date: 3/5/18 Venue: Samburu chiefs camp

No.	Name	ID Number	Telephone	Gender	Signature
1.	Bonveture T Tezita	6723763	0724674593	M	[signature]
2.	Edward Shida Kauli	6722082	0720583976	M	[signature]
3.	KAMANZA MWANDIA			M	
4.	HARRISON MADZOYO	6749571	6749571	M	[signature]
5.	HALIMA CHIGUMBA	6749472	0718871977	F	[signature]
6.	JOSPHINE RAJAB AZIZ	27669212	0724030789	F	[signature]
7.	NZARA WAJULO TSUMA	8394262		F	
8.	ALICE KIMANI	12475041	0727492925	F	[signature]
9.	MEJUMAA TSIMBA		0726318998	F	[signature]
10.	STEPHEN NBORO JULO	27185043	0716324896	M	[signature]
11.	MANGARE KOMBE	6748820	0748258653	M	[signature]
12.	KAHONZI BENJIRA		N/A	F	
13.	NYAMVULA MDZOMBA		N/A	F	
14.	MKALA GALUKA	11366526	0722706342	M	[signature]
15.	NGUTA CHILALU	20068304	0706323423	M	[signature]
16.	TSUMA HARANZA	31989154	0707043779	M	[signature]
17.	SHIDA NDIMIRO	8390089	0707707368	F	
18.	MBETU BAGALA	23934093		F	
19.	Dzivo Moloe Dzivo	5426800	0724289624	M	[signature]
20.	MWAKA CHANGU	35108603		F	
21.	MWAKA CHANGU	2211508		F	
22.	NZINGO BENJIRA	9875454		F	
23.	DAKALE NTAMAWI	8394180		F	
24.	JANET TATU MUTTA	29199070	0707191168	F	[signature]
25.	MJENI TSUMA	27343752		F	
26.	MBETU MWAMWAHU	27347825.		F	
27.	MOSE BONGO CHIRUMBA	2217236		F	
28.	NYAMVULA KASIDI	27347195		F	
29.	FATUMA MOHAMED MATANO	24986552		F	
30.	MWANATDI KAMBE MWIKA	20881002		F	

VERIFIED BY: MUNDU SALEM DESIGNATION: SNR CHIEF SIGN: [signature]

APPROVED BY:.............................. DESIGNATION:.............................. SIGN:..............

SNR. CHIEF MUNDU SAMBURU LOCATION 3/5/2018

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Samburu

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location:.................. Date: 3/5/19 Venue: Samburu Chief. Comp

No.	Name	ID Number	Telephone	Gender	Signature
1.	Chaka Rogers Nyawa	27234527	0714128961	male	[signature]
2.	Mnyazi Neema	8400001		female	Mnyazi
3.	Malau Ngome	27333402	/ /	Male	Malau
4.	NDORO NYAMAWI MWADINGO	12458893	0722139452	male	[signature]
5.	MWANDOGO TSUMA MWANDOGO	9875486	0725314190	MALE	[signature]
6.	Hamis, Nyamawi	27556867	0702455631	M	[signature]
7.	Hassan Tsuma Mwaguto	22366504	0715512934	M	[signature]
8.	Kajiwa Ndegwa Mrima	31072148	0706785297	M	Kajiwa
9.	Salim Deudo Mwero	2018774		M	Salim
10.	Julius Heckoh Hemp	6723597	0713120940	M	[signature]
11.	Wilberforce Ndunga Tsuma	11600765	0707268045	M	[signature]
12.	RUA MWATUNJE		0720990146	M	[signature]
13.	Mangiwa Shume	12597914	0715633999	M	[signature]
14.	Hamisi M Mwatata	3915093	0711 881794	M	[signature]
15.	Mdoe Nalwenzo	2252949		M	Mdoe
16.	Juma Mngande	27403824	0710181899	M	[signature]
17.	Chrisphe Mwangolo	220141	0716758997	M	[signature]
18.	Chalse Ngao	8417486	0797120434	M	[signature]
19.	Mdoe Lumbwa		0713360964	M	[signature]
20.	MADE SUNDO	27934798	0729399352	M	[signature]
21.	TAYARI KAZUNGU	0505606	0720545834	M	[signature]
22.	Lugwe Tsuma	499176	0702795307	M	Lugwe
23.	SAMUEL GONY	1136706	0720306627	M	[signature]
24.	GRACE KIMANI	1103862	072022375O	F	[signature]
25.	Nyanje Nalenza.		0729513009	M	[signature]
26.	Omar Ngaza Mwabeja	6748259	0712016882	M	[signature]
27.	Karege Lomba	6749014		F	Karege
28.	Gabriel Ngaho Nyawa	5336789	0708905977	M	[signature]
29.	Vincent Nyawo Shaum	26379304		M	Nyawe
30.	FRANCIS Mkalla Kea	8411263	0712501782	M	[signature]

VERIFIED BY: MUNDU SULEMAN DESIGNATION: SNR CHIEF SIGN: [signature]

APPROVED BY:................................ DESIGNATION:...................................... SIGN:...........

SNR. CHIEF MUNDU-SAMBURU LOCATION 3/5/2019

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FRANCIS ALLEN CONSULTING

CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE.

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: Samburu Date: 03/05/2018 Venue: Samburu chief Camp

No.	Name	ID Number	Telephone	Gender	Signature
1.	Mwamkono Nyawa Bengowa	2274123	0715694339	M	Bengowa
2.	FRANCIS NGAZI CHAMTU	24748876	0727670137	M	[illegible]
3.	JOHN CHOME	26884672	0710480199	M	[illegible]
4.	ATHUMAN MWAMBIRE IBRA	21226078	0725614389	M	[illegible]
5.	James Dzimba Nyamawi	21622577	0728780131	M	[illegible]
6.	Dele Hinduma	5321570	0701886592	M	[illegible]
7.	Patrick Julo Chengo	0313996		M	[illegible]
8.	Anzazi Juma			F	Anzazi
9.	Mlande Mwame			F	Mlande
10.	Katembo Ngowe	26031902	07[illegible]3685	M	[illegible]
11.	Patrick Julo Shauri	27069986	0729462844	M	[illegible]
12.	Samson Mazere Mwadzuya	10227927	0707727393	M	Sumson
13.	Wato Msurra Kahindi	2267528	0718201805	M	[illegible]
14.	Ali Mdoe Dena	32049707	0706268538	M	[illegible]
15.	Joseph Ndegwa Nyamawi	13376183	0701591732	M	Joseph
16.	Ngole Dzivwe Mwadenda	31525079	0720416070	M	Ngolo
17.	Dzame Mazera	13282679	0715388216	F	Dzame
18.	Mkala Mwura	9880068	0707715885	M	[illegible]
19.	Kambi Ndonga Mkoma	0508314	//	M	KMBI
20.	Meri Chanuatu	3419126	07	M	Meri
21.	Galunda Dalu Mapigga	0468685		M	galunda
22.	Luvuno Mashua			F	Luvuno
23.	Mwalimu Chilio	26235814	0711889674	M	[illegible]
24.	Chinyavu Nyanje			F	chinye
25.	Mjeni Jumaa			F	Mjeni
26.	Mbodze Deule			F	Mbodze
27.	Mariam Bruce			F	Mjeni
28.	Charles Chibebe	6749148	0716381086	M	[illegible]
29.	Chizi Mafuu	20259498	0706667355	F	CHIZI
30.					

VERIFIED BY: Mwanyo Suleiman DESIGNATION: SNR CHIEF SIGN: [illegible]

APPROVED BY:.............................. DESIGNATION:.............................. SIGN:..............

SNR. CHIEF MUNDI SAMBURU LOCATION 3/5/2018

TARU 3/5/18

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CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE.

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: TARU Date: 03/05/2018 Venue: CHIEF'S OFFICE

No.	Name	ID Number	Telephone	Gender	Signature
1.	Anthony Ndoro	31474924	0706646010	MALE	[signature]
2.	KALLISTUS SHIKOKOTI	20099157	0729533958	M	[signature]
3.	JUMAA MUGUMI	27844981	0795571816	m	[signature]
4.	JOHN MUYA	9393549	0722554401	M	[signature]
5.	ALEX PATAYE	28252888	0714053406	m	[signature]
6.	Kweche Mbega	23472450	0714831123	M	[signature]
7.	MENUNA M. NDEGWA	8409223	0740601169	FM.	[signature]
8.	LUCY M. NDEGWA	9654026	0724266961	FM	[signature]
9.	Magret Wacheke	24447031	0725765133	Fm	[signature]
10.	MURISA N. CHIGUMBA	10505298	0721689171	MALE	[signature]
11.	JONATHAN N. SHELI	25870167	0726975534	MALE	[signature]
12.	JULIUS MWAMKONO	23510822	0723829969	M	[signature]
13.	NYAMA ZENGA	6722534	0700841292	MALE	NT
14.	JUMAA MDAIKULA	27975512	0725241673	MALE	[signature]
15.	SULEIMAN MANGALE	23836153	0710735800	MALE	[signature]
16.	CHALE MAKOMA				
17.	SAIDI CHAKAYA	11601983	0701289929	M	[signature]
18.	ABDALLA BATI	216098	—	M	ABDALLA
19.	MOHAMED CHOME	27617139	0723434650	M	[signature]
20.	RICHARD KARUMBA	24324361	0720622973	M	[signature]
21.	JOSPHINE UMAZI	26643709	—	F	[signature]
22.	SCOLAR KAFICKYA	13624805	0711557925	F	[signature]
23.	Charles Mwangi	6572632	0724488583	M	[signature]
24.	Isimba Chiboya	6748567	0726797552	M	[signature]
25.					
26.					
27.					
28.					
29.					
30.					

VERIFIED BY: Raphael Ruwa DESIGNATION: Chief SIGN: [signature]

CHIEF TARU LOCATION

APPROVED BY:................ DESIGNATION:................ SIGN:................

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COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: VOI Sofia Date: 08/05/2018 Venue: SOFIA BOMA HALL

No.	Name	ID Number	Telephone	Gender	Signature
1.	Aricho Munkamba	31468640	0700598902	male	[illegible]
2.	Festus Mwoe	4877717	0717765561	Male	[illegible]
3.	Titus Mwachiti	23031214	0726380534	Male	[illegible]
4.	Purity Shuma	24493820	0715859775	F	[illegible]
5.	Eliza Wughanga	31297246	0714131092	F	[illegible]
6.	Solomon Mwakina	20922762	0708664472	male	[illegible]
7.	James Mwaghali	9319903	0726991097	male	[illegible]
8.	John Mwamini	0723790375	5549088	M	[illegible]
9.	Josephine Chiro	0707-159857	22170121	F	
10.	Florence Mwadime	27771054	0718834994	F	[illegible]
11.	Martha w. Mwabili	5274295	0725139637	F	[illegible]
12.	SALIM ALI	27198125	07918131		[illegible]
13.	ELPINAH CHAO	12249745	0723766461	F	[illegible]
14.	CHRISTINE MKAMBURI	36705315	0797006378	F	[illegible]
15.	HOLINESS JAMBA	29171122	0708637013	F	[illegible]
16.	GERUDE ISANGA	22736070	0729260564	F	Gm
17.	ROSE KAMAU	6093019	0722756696	F	[illegible]
18.	EMILY MGHO		0728674811	F	[illegible]
19.	ELI CHOW	20563346	0724147619	M	[illegible]
20.	DANIEL G. MWACHARO	25866584	0715948558	M	[illegible]
21.	Michael Mwanyalo	32277941	0712628651	M	[illegible]
22.	GILEAD MBOMBO	22921995	0740561288	M	[illegible]
23.	PETER MATI	7004568	0712002274	M	[illegible]
24.	STEPHEN NGAO	2273963	0722-217751	M	[illegible]
25.	RAPHAEL NGAO	1370994	0797467125	M	[illegible]
26.	Samson Mwamzandi	5323123	0790773174	m	[illegible]
27.	Msafiri Mnganga	20503628	0713142506	m	[illegible]
28.	RODGERS KITOTO	29520917	0728959850	m	[illegible]
29.	FRANCIS SHANGALA	36427380	0724234030	m	[illegible]
30.	GASIF R' MKOMBE		0711237919	m	[illegible]

VERIFIED BY: ABEL MONAH DESIGNATION: Sub-chief SIGN: [illegible]

APPROVED BY:........................ DESIGNATION:........................ SIGN:..............

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CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE.

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: VOI Date: 09/5/2017 Venue: SAFA BORA HALL

No.	Name	ID Number	Telephone	Gender	Signature
1.	PRISCILLA MBHAMBA	01582215	0725097796	F	
2.	Zainab Wario	10395561	0794319039	F	
3.	Salama MKabili	9216758	0713963631	F	
4.	Ruth Mwawasi	11655700	0756277890	F	
5.	LUCIA KAJUMA	24483388	0795339788	F	
6.	NAOMI MAJALA MKALA	22722986	0723589696	F	
7.	MUSA KARAHJA SIDI	23021162	0701559566	M	
8.	JEDIDAH NJAJA MWAKUGHU	26361402	0717785829	F	
9.	MARTIN KILUMJA MWAKUGHU	26361402	0717785829	M	
10.	GRACE MWAHE	20531935	0716764905	F	
11.	JANE MWACHOFI	5470919	0711133531	F	
12.	BEATRICE MWAKAMU	8947279	0720008495	F	Beatrice
13.	MAGDALINE MAWONDO	6222178	0726413576	F	Mwende
14.	ALICE MWASAMBO	6705396	0724013215	F	
15.	SAKINA HAMISI	20530759	0724629564	F	
16.	Martin Koome	33956726	0704666746	M	
17.	STEPHEN NJOGHOLO	27449916	0732907862	M	
18.	Joseph Mwamburi	28070677	0799852813	F	
19.	CAROLINE AUMA	12454477	0720342125	F	Cama
20.	EVELINE KAMBALE	20491202	0717304660	F	
21.	MARY NYAMBURA	8520617	0713664747	F	
22.	SAIMON MWANGI	31061170	0712395885	M	
23.	MILIPH WAIGIMU	25205376	0712621637	F	
24.	LEAH NDUATI	29373735	0715503886	F	
25.	MARK MACHIRA MBANGI	25603974	0738912513	M	
26.	Bevingtone Maghanga	35422627	0741140393	M	
27.	ALBERT MWALASHA	36209062	0710280728	M	
28.	Peter MZee	33190155	0740597439	M	
29.	Joshua Aluoch	32776117	0791675320	M	
30.	MASTER KALENJA	04038564	0727660772	M	

VERIFIED BY: [illegible] DESIGNATION: [illegible] SIGN:

APPROVED BY: DESIGNATION: SIGN:

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CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE.

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: VOI Sofia Board Date: 8/5/18 Venue: Sofia Bong Hall

No.	Name	ID Number	Telephone	Gender	Signature
1.	CATHERINE MWIKALI	28268719	0704353706	Femal	[signature]
2.	Jimmy Mwakateza	26372403	0713555120	M	[signature]
3.	EMILY MWAKEDI	32812228	0743364225	F	[signature]
4.	ROSELYNE KAMBUA		0797386954	F	[signature]
5.	JENTA MWANGANDA	14510200	0725101106	F	[signature]
6.	Dorah Chao	3953177	0726587814	F	[signature]
7.	PHILISIA MWANGO'MBE	1371058 4	070061005 4	F	[signature]
8.	Margaret Nyange	9787959	0714598540	F	[signature]
9.	PHILLISTER KISALA	13271599	0716519792	F	[signature]
10.	Hawmilton Kadanga	28407002	0713039770	M	[signature]
11.	Suleiman Mwanzfuai	28156407	0792642886	M	[signature]
12.	Idd Hamisi	32394758	0795501863	M	[signature]
13.	MWAMA SE MWANDI	28902870	0707169262	M	[signature]
14.	JACKLINE MPENDWA	9378616	0726761888	F	[signature]
15.	Eunice mkecume	21229044	0706670097		[signature]
16.	Susan mchang	27039432	0710305234		[signature]
17.	Johnson Mola	28051478	0713060623	M	[signature]
18.	HANNAH Shoti	8022617	0710867367		[signature]
19.	DEBORAH MNALUMA	22501811	0720211035	F	[signature]
20.	ANNASTANCIA MWAKA	2706994	0707042826	F	[signature]
21.	Malik AZIZ		0719798119	M	[signature]
22.	RUPHENCE WANJALA	29028416	0725549966	F	[signature]
23.	SHADRAC MWANGEMI	31192823	0791061419	M	[signature]
24.	David ndeu	28759764	0713984615	M	[signature]
25.	JOHN MWAMBURI	23365160	0729598882	M	[signature]
26.	Margaret Pesho	11654660	0701646111	F	[signature]
27.	WAKIO Mzozo	14511534	0725959424	F	[signature]
28.	RELINDAH ATEHO	28732061	0701665188	F	[signature]
29.	FELESTINA MWASARU	30071940	0707061586	F	[signature]
30.	Agnes wakasha	20186359	0728872607	F	[signature]

VERIFIED BY: Abel Mwakau DESIGNATION: SNR. CHIEF I SIGN: [signature]

APPROVED BY:.............................. DESIGNATION:.............................. SIGN:..............

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SENIOR CHIEF VOI LOCATION

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CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE.

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: VOI Date: 08/05/2018 Venue: SOFIA BAYA HALL

No.	Name	ID Number	Telephone	Gender	Signature
1.	Martha Kasimu	32107216	0798519606	F	[signature]
2.	Janet Maigeo	20114831	0713375721	F	Janet
3.	Zainab Mwalimo			F	[signature]
4.	Rosemary Mbohuka	14459635	0714212667	F	[signature]
5.	Irene A. Owuor	22848577	0726659142	F	Owuor
6.	Naumi Talu	4654043	0713439792	F	Naumi
7.	Paul Mubo	22990168	0720428550	M	[signature]
8.	Ali Rashid	24126804	0724897950	M	[signature]
9.	Kennedy Nambua	8325303030	0718923184	M	[signature]
10.	Mohammed Omari	30257013	0726410612	M	[signature]
11.	Hezbon Mwangi	32733943	0726388198	M	[signature]
12.	Naftal Ngoe	22814666	0776223775	M	[signature]
13.	Michael Mwabaru	2913A6AL	0715581150	M	[signature]
14.	Musa Mwarime	21866101	0728901927	M	[signature]
15.	Elias Kyomba	1382205	077335270	M	[signature]
16.	Laurent Kiringha	24464273	0729496526	M	[signature]
17.	Susan Kamulo	9319252	07298300977	F	SMwamba
18.	Betty wakesho	31537527	0799852898	F	[signature]
19.	Michael mzee		0712896448	M	[signature]
20.	MANDE KIJONGA		0710197499	M	[signature]
21.	William Lalu	23612371	070499888	M	Lalu
22.	Mohamed mwachofi	31467775	0710291340	M	[signature]
23.	Victor Righa	32610677	—	M	[signature]
24.	Hudson Mghanga	34968387	0799851134	M	[signature]
25.	Erick Kalama	33809380	0728224348	M	Kalama
26.	Elijah Oggi	29658505	0703523724	M	[signature]
27.	Timothy Mbithi	28152669	0703298044	M	[signature]
28.	Hamilton Mboghe	11311180	0711232684	M	[signature]
29.	Anthony Mwadime	13270821	0728677217	M	[signature]
30.	Phyllis Hawa	35189192	0728586448	F	Phyllis

VERIFIED BY: ABEL MWANGANI DESIGNATION: S/R CHIEF SIGN: [signature]

APPROVED BY:.................. DESIGNATION:.................. SIGN:..................

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COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: VOI Date: 08/05/2018 Venue: SAFIA BOMA HALL

No.	Name	ID Number	Telephone	Gender	Signature
1.	PENINA OGAMA	31308044	0728677289	F	
2.	IBRAHIM MWACHOFI KIDUE	31099088	0799295962	M	
3.	ALEXANDER MUJAMBE NGUMBAU	24765877	0721514162	M	
4.	BENSON KIPACHA	37017482	0714575736	M	
5.	SALIM JUMAA	32093783	0791016421	M	
6.	ALI SULAIMAN KAMBIA	29851103	0704403400	M	
7.	BAKARI KHAMISI	34429758	0702816592	M	
8.	MOHAMED KATAMA	5348015	0708168198	M	
9.	GRACE MALEMBA KISAGHI	29016420	0704034650	F	
10.	HANNAH MKANDOE MWARIO	3479795	0705945126	F	
11.	Dalton Mwadime Mwalo	25266103	0702771049	M	
12.	AMBROSE MWATIKA MWANDEGA	35343312	0743364835	M	
13.	KALAMA PETER KEFORD	30289165	0702972466	M	
14.	PETRO LUKIO	31470036	0705520605	M	
15.	PATRICIA MUIUVE	28116616	0726982811	F	
16.	Jackson Mboga	22191628	0721490659	M	
17.	SALIM MWALILI	21624893	0728706918	M	
18.	JOHN OKUTIA ADONGO	2273274	0723405399	M	
19.	ABDALLAH M. JUMA	0074918	0735996883	M	
20.	JOSHUA MWAUZA IGUJA	24612380	0717562427	M	
21.	BAZILISA RUNGA	11655913	0726581644	F	
22.	JANET MWENDWA	27973918	0725791137	F	
23.	EDWARD ROPA	28401632	0722131083	M	
24.	RAPHAEL MWAWASI	6686774	0722733494	M	
25.	MWAKITETE MWAMBURI	20137950	0705256576	M	
26.	ANDREW MWAMBURI	2272114	0717559771	M	
27.	JOHN JUMBE	6701349	0701174393	M	
28.	JOHANA NGAI	3504433	0714567497	M	
29.	IDDI ATHUMAN	0151389	0724678194	M	
30.	NAIHAM JERI	22333570	0799421350	M	

VERIFIED BY: DESIGNATION: SIGN:

APPROVED BY: DESIGNATION: SIGN:

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CONSULTANCY SERVICES FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (INCLUDING CUMULATIVE IMPACT ASSESSMENT) AND RESETTLEMENT ACTION PLAN MZIMA II PIPELINE.

COMMUNITY PUBLIC PARTICIPATION (CPP) LIST

Location: Voi Sofia Date:.................. Venue: Sofia Bong Hall

No.	Name	ID Number	Telephone	Gender	Signature
1.	FRANCIS SHANGALA	36427380	0724234030	M	[signature]
2.	Herman Madoka	35422759	0799360679	M	[signature]
3.	Gabriel Mwawaji	35791551	0712899473	M	[signature]
4.	Jonam Malombo	34508208		M	[signature]
5.	ELIJAH Mwandima	32203798	0706492283	M	[signature]
6.	Margaret Mwatao	33920033	0798381134	F	Margaret
7.	Crispin Pendo		0704364302	F	[signature]
8.	AP TOLE	6461235	0704497353	M	[signature]
9.	LAZARO N MCHETE	28149483	0718967294	M	[signature]
10.	Joseph Mwandawiro	10395667	0798287539	M	[signature]
11.	Raysen Mghengo	2248231	0705749729	M	[signature]
12.	OLIVER KILEI	23919335	0726918348	M	[signature]
13.	ONESMAS KOMBO	20005261	0726918348	M	[signature]
14.	HARINGTONE MKALA	33574478	0790361799	M	[signature]
15.	SAIDU SALIM	20191526	0703579171	M	[signature]
16.	Daniel Muresan	25846622	0706510837	M	[signature]
17.	ELIJAH OTIENO	29658505	0703523734	M	[signature]
18.	TONNY MATINO	28420605	0719315904	M	[signature]
19.	Elvis Kalama	32974486	0715672041	M	[signature]
20.	Cosmas K. Mwawana	29452667	0702165132	M	[signature]
21.	Boniface Mwaghanga	22767191	0728079658	M	[signature]
22.	NASHON Juma	11968664	0720257453	M	[signature]
23.	Ibrahim Mwabili	20985072	0704276708	M	[signature]
24.	Mchome Danson	35876202	0742801401	M	[signature]
25.	Wilfred Kaeto	33624185	0791784039	M	[signature]
26.	Justus Kilonzo	12430050	0727491821	M	[signature]
27.	Joshua Nyambu	21092624	0720844148	M	[signature]
28.	PETER JUMATSO	27062472	0716420699	M	[signature]
29.	JOHNSON Mwamasi	14510415	0723871311	M	[signature]
30.	R. Mwambi Mzee	13100?2	0712127525	M	[signature]

VERIFIED BY: ASHA Mwandembo DESIGNATION: SNR. CHIEF SIGN: [signature]

APPROVED BY:.................. DESIGNATION:.................. SIGN:..................

SENIOR CHIEF VOI LOCATION

Energy | Research | Training | Environment | Community Service

Appendix 20: EIA Team Composition

Name	Qualification	Position
Dr Stephen Chege Wairuri	▪ Doctor of Philosophy (Environmental Studies and Community Development), Kenyatta University ▪ Master of Environmental Studies and Community Development, Kenyatta University. ▪ Bachelor of Environmental Studies (Arts), Kenyatta University ▪ Lead Expert for Environmental Impact Assessment/Audit	Environment Specialist (Team leader)
Eng. Patrick N Wambuki	▪ Master of Science in Management of Water Resources ▪ B.Sc.(Hons)(Civil Engineering) ▪ Lead Expert for Environmental Impact Assessment/Audit	Civil Engineer- Water Management
Carolyne Mukhuhungu	▪ BSc. in Geospatial Engineering The University of Nairobi ▪ FDB/GIS (Geographic Information System) data collection Kenya Power training school	Registered Surveyor/GIS Specialist
Dr Paul Muoria	▪ Doctor of Philosophy (Animal Ecology), Kenyatta University; ▪ Master of Philosophy (Environmental Studies), Moi University; ▪ Bachelor of Science (Wildlife Management), Moi University, Kenya - 1990	Ecologist
Joy Wasirimba	▪ Masters in Business Administration (Kenyatta University)	**Environment Expert**

	▪ Bachelor of Arts Degree in Social Work and Social Administration	
Elijah K. Mutuango	▪ Masters in Business Administration (University of Nicosia), ▪ Degree in Sociology and Economics	**Social Expert**
Annabel Waititu	▪ Master of Arts (Development Communication) , Daystar University, Nairobi ▪ B.Com**,** Economics, Jabalpur University, Madhya Pradesh India.	**Sociologist/gender Expert**
Lawrence Muchiri	▪ MSc, University of Reading, UK, 1977 ▪ BA (Hons) Land Economics, University of Nairobi, 1971	**Registered Valuer**
Victoria Mumbi	▪ Bachelor of Environment Studies(Community Development)– Kenyatta University	**Gender Expert**