



REPUBLIC OF KENYA  
MINISTRY OF WATER AND IRRIGATION

Northern Water  
Services Board



# **REVIEWED EIA for Wamba Zoned Rockfill Dam Wamba Town Samburu East Sub-County, Samburu County**



## **IMPORTANT NOTICE**

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### **WAMBA MEGA DAM: ENVIRONMENTAL IMPACT ASSESSMENT REPORT**

**CLIENT:** NORTHERN WATER SERVICES BOARD

**ASSIGNMENT:** TO CARRY OUT ENVIRONMENTAL IMPACT ASSESSMENT STUDY ON WAMBA MEGA DAM PROJECT

**REPORT TITLE:** ENVIRONMENTAL IMPACT ASSESSMENT STUDY – WAMBA MEGA DAM PROJECT

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**Disclaimer:**

This environmental impact assessment study report is based on information made available by the client to the consultants and findings from field assessment. It is strictly confidential.

## GLOSSARY OF TERMS

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**Aquifer:** A geological formation of permeable rock, gravel or sand containing or conducting groundwater. Water is usually derived from the aquifers through boreholes, wells, springs or base flow in water courses.

**Environment:** Includes all the physical factors of the surroundings of human beings including land, water, atmosphere, climate, sound, odour, taste, the biological factors of animals and plants and the social factor of aesthetics and includes both the natural and the built environment.

**Environmental inventory (baseline information):** Is a description of the environment as it exists in an area where a particular proposed action is being considered.

**Environmental Management Plan (EMP):** Is a document usually included in the EIA study report proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment; including the cost, time frame and responsibility to implement the measures.

**Environmental management:** Includes the protection, conservation, and sustainable use of the various elements or components of the environment.

**Environmental monitoring:** The continuous or periodic determination of actual and potential effects of any activity or phenomenon of the environment whether short term or long term.

**Ephemeral:** Seasonal stream

**Guidelines:** means the guidelines describing the methodology for implementation of EIA requirements adopted by authority.

**Lagga:** A dry river valley; it contains water only during the rainy seasons and for a short period thereafter.

**Manyattas:** Traditional settlements, usually comprising of several huts and a livestock area belonging to members of a family, all enclosed within a (thorn-covered) fence.

**Mitigation measures:** Include engineering works, technological improvements, management, and ways and means of minimizing negative aspects, which may include socioeconomic and cultural losses suffered by communities and individuals whilst enhancing positive impacts of the project.

**Natural resources:** Include resources of air, land, water, animals and plants including their aesthetic qualities.

**Sustainable development:** Development that meets the needs of the present generation without compromising the ability of the future generations to meet their needs by maintaining the carrying capacity of the supporting ecosystem.

**Sustainable use:** Means present use of the environment or natural resources, which does not compromise the ability to use the same by future generations or degrade the carrying capacity of supporting ecosystems.

## OVERVIEW

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### A. Background

Wamba Town is the District Headquarter of Samburu East Sub-County which was carved out of Samburu in year 2007. The town hosts several departmental heads and there is mushrooming of commercial activities which befell a sub-county headquarter like Wamba Town.

The existing spring water from Mathews Ranges is inadequate. The supply is being rationed twice weekly. The current production is estimated at 168m<sup>3</sup>/day against the water demand of 1004m<sup>3</sup>/day implying that the water coverage is estimated at 16.7% (168/1004)

Arising from the foregoing and in order to spur economic growth, Wamba Town Water Supply has to be augmented to at least satisfy the current water demand.

### B. Purpose of the Project

- (a) The Total Water Demand of Wamba Town is estimated at 1,730m<sup>3</sup>/day by the year 2036.
- (b) The Ministry of Water and Irrigation Guidelines for the Design, Construction and Rehabilitation of Small Dams and Pans in Kenya dated June, 1992, table 2.1 indicates the dry spell to be assumed to be 9months.

However, due to climate change, it is recommended that the dry period be assumed to be **11months**.

Hence the storage required to provide **1,730m<sup>3</sup>/day** by year 2036 is **742,170m<sup>3</sup>** by assuming a dead storage of **30%** against current construction 257,335.25m<sup>3</sup>.

- (c) During dry spell the conflict between wildlife and human escalates since the Mathew ranges spring dry forcing wildlife to look for water in homestead.

Arising from above, construction of this dam will minimize human-wildlife conflict due to provision of water to wildlife from the dam and provide portable water to Wamba Town which is stagnating due to lack of water and spur economic growth.

### C. Need for an Environmental Impact Assessment (EIA) Report

In fulfillment of National Environmental Management Act of 2016 (NEMA) and EIA and EA regulations of 2003, Eng. Kasabuli is undertaking ESIA for construction of Wamba Mega Dam with a view of Augmenting Wamba Town Water Supply. The purpose of this ESIA study is to identify, predict and evaluate the impacts on the social, economic, biophysical and cultural components of the environment. Environmental Management and Co-ordination Act Chapter 387 revised in 2016 in 2<sup>nd</sup> schedule section 58 (1) (4) lists Dam Development as requiring to undergo Environmental and Social Impact Assessment.

Therefore this ESIA report describes the proposed project, the receiving environment, existing legislative framework, investigates available alternatives and develops environmental management plan to limit adverse environmental impacts.

### D. Project Proponent

The proponent is Northern Water Services Board (NWSB).

The NWSB covers an area of about 244,860km<sup>2</sup> covering almost all the arid and semi areas of the country representing about 42% of Kenya's geographical area of 582 646 km<sup>2</sup>. and consisting of Twenty Three (23) districts of Ijara, Garissa, Fafi, Laghdera, Wajir Central, Wajir

South, Wajir North, Mandera West, Mandera Central, Mandera East, Moyale, Sololo, Laikipia East, Laikipia West, Laikipia North, Samburu East, Samburu West, Samburu North, Isiolo, Garbatulla, Marsabit, Chalbi and Laisamis. Ten of the Districts are located in Northern Eastern, Six in Rift Valley and Seven in Eastern Provinces.

The population of the board is about 2.0 million as projected in 2002 from the 1999 census data and has approx. 70% of the livestock in Kenya in the area. The bulk of the population resides in towns and other administrative centres.

NWSB was established under the Water Act 2002 vide Gazette Notice No. 1716 of 12<sup>th</sup> March 2004 as a state corporation reporting to the Ministry of Water and Sanitation (MW & S) and subsequently launched on 7<sup>th</sup> December 2004. It has been licensed by the WASREB to provide water and sanitation services in the northern region.

## **E. Project Location**

The project area is in Samburu East Sub-County, Samburu East Sub-County in Kenya. It is located in Samburu National Reserve. Wamba town is the nearest market center and is the headquarters of the Wamba administrative division and the proposed supply area.

The Sere Rongai (Wamba Mega) dam is to be constructed near Wamba town which is the headquarters of the Wamba administrative division, about 7km upstream of Wamba Town.

Wamba Town is the District Headquarter of Samburu East District which was caved out of Samburu in year 2007.

## **F. Description of Proposed Development**

Wamba Mega Dam is a proposed 15m high zoned rock fill dam of capacity 257,335.25m<sup>3</sup> and which will submerge 6.17 hectares of Samburu National Reserve.

The proposed dam will take about 3 months to get filled with water every year.

The project area is located in Samburu East Sub-County, Samburu East Sub-County in Kenya. It is located in Samburu National Reserve. Wamba town is the nearest market center and is the headquarters of the Wamba administrative division and the proposed supply area

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The development of the dam will involve:

- Construction of a 15m high cofferdam.

### **Characteristics of Wamba Dam**

*Wamba Mega Dam is a proposed 15m high zoned rock fill dam of capacity 257,335.25m<sup>3</sup> and which will submerge 6.17 hectares of Samburu National Reserve.*

The proposed dam will take about 3 months to get filled with water every year.

<b>A1. LOCATION</b>		
County	Samburu	
Sub-County	Samburu East	
Source	Sere Rongai-Sere Fereji Stream	
Drainage Basin	EwasoNg'iro North	
Purpose	Domestic Water Supply for Wamba Town and Environs	
Survey of Kenya Map SK	93/2-Wamba(1:50,000)	
COORDINATES	UTM	DEGREES
	Region	37N
	Longitude	315456E E037.341
	Latitude	106671N N00.96466
Altitude	1362M	
<b>A2. CATCHMENT</b>		
Area	14.60 km <sup>2</sup>	
Average slope	24%	
Maximum probable flood (PMF)	328.13m <sup>3</sup> /s	
<b>A3. RESERVOIR</b>		
Design Capacity	257,335.25m <sup>3</sup>	
Submerged area at NWL	6.171Hactares	
<b>A4. EMBANKMENT</b>		
Type	Zoned Rock-fill Embankment	
Height	15m	
Crest Length	203.844 m	
Crest Width	8.0m	
Upstream Slope	1:3.0	
Downstream Slope	1:2.5	
Gross Freeboard	3.0 m	
Estimated Lifespan	15 years	
Estimated Investment Required	208,491,484	

### Project Budget

The Construction of Sere Rongai Zoned Rock fill Dam is estimated at Kshs 208,491,484.

Table 0-1 has the details.

Table 0-1: SERE RONGAI ZONED ROCKFILL DAM

SERE RONGAI ZONED ROCKFILL DAM		
SUMMARY PAGE		
BOQ No	Description	Amount
		Kshs
1	Preliminary and General Items	22,388,545
2	Dam Works	176,174,774
	Sub-Total	198,563,319
	Add 5% for Contingencies and Price Excalation	9,928,166
	<b>Grand Total</b>	<b>208,491,484</b>

### G. Environmental Management Plan

This is aimed at identifying mitigation measures for negative impacts already identified so that the mitigation measures are incorporated in the water and sanitation project design. The

mitigation measures will, on the one hand, eliminate or offset adverse environmental and social impacts or reduce them to acceptable levels and, on the other hand, reinforce measures for enhancements. Feasible, cost-effective measures are proposed.

The strategies employed for impact mitigation are avoidance, reduction and remedy as suggested in Table 0-2.

Table 0-2: Proposed Environmental Mitigation Plan

Impact	Mitigation measure to be taken	Project Phase	Responsibility	Cost
Land Acquisition	Pay relevant Fees to Kenya Forest Service	Planning, Construction and Operation and Maintenance Phase	NWSB, Contractor, KFS	BOQ
Community Resisting the project	Sensitization	Continuous	NWSB, Samburu County Government and KFS	BOQ
Water Resources depletion	Catchment protection by exercising the following: <ul style="list-style-type: none"> <li>Promoting an effective water resource management program.</li> <li>Initiate afforestation and agro- forestry program for soil and water conservation.</li> <li>Initiate community capacity building on water management, sanitation, operation and maintenance.</li> <li>Ensure that environmental flow requirements are met by releasing steady and adequate flow from the dam reservoir.</li> </ul>	Pre-construction/Construction phase/Operation Phase	Contractor, NWSB, WRMA, DFO & DEO (Samburu East)	BOQ
Dust generation	<ul style="list-style-type: none"> <li>Enclosing demolition sites.</li> <li>Spraying water on dusty roads.</li> <li>Covering or enclosing transportation vehicles, controlling the speed of vehicles, and selecting transportation routes to minimize impact on dust sensitive receivers.</li> <li>Covering or watering open spoil or storage sites.</li> <li>Minimizing on-site storage time of construction materials.</li> </ul>	Construction	Contractor	BOQ
Noise generation	<ul style="list-style-type: none"> <li>No construction using heavy machinery, from 22:00 to 6:00 Hrs, near settlements and boarding schools.</li> <li>Non-discretionary use of noisy machinery within 50 m of settlements and boarding schools.</li> <li>Good maintenance and proper operation of construction machinery to minimize noise generation.</li> <li>Installation of temporary sound barriers if necessary.</li> <li>Selection of transport routes for large vehicles to avoid settlements and schools.</li> </ul>	Construction	Contractor	BOQ
Mixing of soil layers during excavation and backfilling	<ul style="list-style-type: none"> <li>Top soils should be stock-piled separately from subsoils. After completion of work the top soils should be spread over those areas which can be restored in order to facilitate natural regeneration.</li> </ul>	Construction	Contractor	BOQ
Soil erosion through wind and runoff	<ul style="list-style-type: none"> <li>Protective structures should be used to avoid small-scale landslides where soil erosion potential is high eg. Gabions and stable slopes.</li> </ul>	Construction	Contractor, DAO and DEO (Samburu East)	No Costs

Impact	Mitigation measure to be taken	Project Phase	Responsibility	Cost
Soil and drainage disturbance	<ul style="list-style-type: none"> <li>Avoid construction during heavy rains.</li> <li>Planting of conservation vegetation to control erosion and sedimentation.</li> <li>The drainage facilities should be cleared periodically so as to ensure water flow.</li> <li>Avoid hampering surface water drainage and plan for curative measures after construction.</li> </ul>	Construction	Contractor	BOQ
Soil and water contamination from construction and plant equipment	<ul style="list-style-type: none"> <li>No pollutants should be allowed to drain into water courses (this includes sewage and litter).</li> <li>In case of accidental spills, well-coordinated emergency and remedial measures should be put in place.</li> </ul>	Construction	Contractor	No cost
Water contamination of reservoir water	<ul style="list-style-type: none"> <li>Fencing of the dam.</li> <li>Educate the local population on sanitary issues such as the use of pit latrines.</li> </ul>	Pre-construction/Construction phase/Operation Phase	Contractor, NWSB, WRMA, DWO, DPHO (Samburu East)	BOQ
Sedimentation of water courses	<ul style="list-style-type: none"> <li>Care should be taken to minimize and manage the work area to control siltation.</li> </ul>	Construction	Contractor	BOQ
Sedimentation of the dam	<ul style="list-style-type: none"> <li>Regular desilting.</li> <li>Increase of ground cover.</li> </ul>	Pre-construction/Construction phase/Operation Phase	Contractor, Dam Management Committee, WRMA, DWO, DEO (Samburu East)	
Degradation of air quality by vehicular emissions	<ul style="list-style-type: none"> <li>Construction and equipment emissions to be kept within reasonable limits by maintaining equipment to manufacturer's specifications.</li> <li>Contractors to be encouraged to use unleaded petrol and low sulphur diesel for all vehicles and equipment.</li> </ul>	Construction	Contractor	BOQ
Impacts on flora and fauna from site clearing activities	<ul style="list-style-type: none"> <li>Temporarily-used land (eg. during surveys, pipe laying, and vehicle-maintenance areas) will return to its original use upon completion of works.</li> <li>Ensure no trees are removed, but if they are, replanting of indigenous plants and trees should be done.</li> <li>Ensure the required construction period and area is as small as possible so as not to interfere with the fauna breeding periods.</li> </ul>	Construction	Contractor	BOQ
Spread of malaria and communicable diseases such as HIV/AIDS, STD's	<ul style="list-style-type: none"> <li>Implement HIV/AIDS prophylactic treatment through appropriate health promotion through wide distribution and promotion of condom use, improve employment opportunities for affected persons and provision of family accommodation for workers.</li> <li>Where possible, employ people whose families are nearby.</li> <li>Ensure that water supplied is accompanied by appropriate</li> </ul>	Construction and Operation	Contractor, NWSB, DMOH and Water Service Provider	No additional costs



Impact	Mitigation measure to be taken	Project Phase	Responsibility	Cost
	<p>sanitation facilities.</p> <ul style="list-style-type: none"> <li>• Provide information, education and communication about safe use of drinking water.</li> <li>• Environmental management for vector control, use of bed nets and repellents, focal insecticide and molluscicide application, covered water storage, reduced domestic storage, functional drainage.</li> <li>• Work to minimize or altogether eliminate mosquito breeding sites.</li> <li>• Provide appropriate human and solid waste disposal facilities.</li> <li>• Assure a continuous water supply.</li> </ul>			
Gender imbalance in employment opportunities	<ul style="list-style-type: none"> <li>• Give equal opportunities for both men and women for skilled and unskilled work.</li> <li>• Expose and involve women in construction and maintenance activities in an effort to transfer required skills to them eg. Engineers, contractors and administrators.</li> <li>• Involve women groups in environmental management of the works such as construction of gabions.</li> <li>• Enhance gender sensitivity and reduce gender discrimination in construction activities.</li> </ul>	Construction and Operation	Contractor, NWSB	No additional costs
Migrants influx searching for employment	<ul style="list-style-type: none"> <li>• Priority should be given to employing staff from the neighbouring areas. This will minimise community conflicts, spread of diseases and influx of migrants.</li> </ul>	Construction	Contractor	No Cost
Sludge disposal operations	<ul style="list-style-type: none"> <li>• Once pit latrines are full, the wet sludge will need to be exhausted and the dried sludge can be used as a soil conditioner in agricultural farms or disposed of into controlled dumpsites in a safe manner, preventing contamination of delivery routes and landfill sites.</li> </ul>	Operation	Local WRUAs, Dam Management Committee, area MCA	
Environmental awareness	<ul style="list-style-type: none"> <li>• There is a need for increased environmental awareness among all the stakeholders, improved regulation of livestock, comprehensive environmental planning and management, and creation of local partnerships for environmental projects to address the environmental problems in the area that may directly affect the status of available water.</li> </ul>	Construction and operation	NEMA & DEO (Samburu North)	No Cost

## H. Impact Mitigation Costs

Proposed mitigation measures and associated cost estimates can be included in the Engineering Bills of Quantities (BOQ) for the project and the Engineer's estimates. The BOQ should also include the cost of supervision for the implementation of mitigation measures. Table 0-3 is an illustration of the Bill of Quantities for environmental mitigation.

Table 0-3: Bill of Quantities for Environmental Mitigation

No.	Description	Unit	Quantity	Rate Ksh	Amount Ksh
1.	Provide a lump sum for environmental mitigation measures to be used as directed by the Engineer.				
2.	Include percentage of item above for contractor's overheads and profit.	%			
3.	Grass over side slopes in fills and cuts.	M <sup>2</sup>			
4.	Back filling of trenches as directed by the Engineer to the recommendations of the EIA.	M <sup>3</sup>			
5.	Provide and erect 1.5m high fences upheld with concrete posts at 2m intervals around the dam as directed by the Engineer.				
6.	Provide, plant, water and care for all vegetation until firmly established as directed by the Engineer as EIA specification.	No.			
<b>TOTAL</b>					

It is crucial that all mitigation measures being implemented by the contractor be done in close association and supervision of NWSB, for purposes of future mitigation, monitoring and elevation.

## I. Environmental Monitoring

Environmental monitoring will ensure that:

- i. The procedures recommended in the approved EIA report are adhered to by the various agencies;
- ii. Environmental, social mitigation and enhancement schemes are well understood and communicated to all involved parties, including the general public;
- iii. Proposed environmental and social remedial measures are implemented during the project execution stage;
- iv. Evaluation is made of the effectiveness of environmental and social remedial measures.

A detailed EMP will evaluate the extent and severity of environmental impacts as compared to the predicted impacts, the performance of the environmental protection measures and compliance with related rules and regulations, the trends of impacts and the overall effectiveness of the project EMP.

The EMP should be carried out by qualified staff with equipment and technical capacity to monitor the aquatic, air, and physical environment (noise), soil and receiving water conditions, solid waste disposal, industrial pre-treatment, water source pollution control and traffic conditions. When any complaints are received from the public, monitoring staff will immediately conduct additional inspections and tests carried out in accredited laboratories.

Table 0-4 presents the potential indicators that will be used to monitor the implementation of the project. The indicators are selected according to the project context and major anticipated impacts.

Table 0-4: Environmental Impacts Monitoring Plan

Environmental Component	Indicators: Measures taken or to be taken	Monitoring frequency	Monitoring Point
Atmosphere	A) Construction Phase (i) Monitoring Item: Dust	Once/week for 1 day	Main construction sites and materials transportation roads near sensitive points and areas.
	(B) Monitoring Standard: Atmospheric Monitoring Standard Issued by NEMA.		
Noise	(A) Construction Phase (i) Monitoring Item: Noise	Once/week	Construction sites within 50m of settlements.
	(B) Monitoring Standard: Existing Noise Standard issued by NEMA.		
Water Quality	(A) Construction Phase (i) Monitoring Item: SS, Oil & E. Coli	3 times/year for two times/day	2 points
	(B) Operation Phase (i) Monitoring Item: SS & Oil	<i>Once/year</i>	
	(C) Monitoring Standard: Water Quality Standards issued by NEMA.		

## J. PUBLIC CONSULTATIONS

### Introduction

For infrastructure projects having potential impact on the environment, extensive public participation is a legal requirement. Public participation allows the local community to fully understand objectives and implementation of the proposed project, the potential adverse and beneficial impacts and associated mitigation measures. One of the purposes of public participation is to understand the habits, preferences and needs of the affected persons.

### The General Public

Information from the public was obtained through group interviews and individual interviews. The general public highlighted several key aspects that were to be considered while implementing the development.

A summary of the worries and issues discussed by the beneficiaries are listed below:

- i. Whether the dam would be able to hold enough water to serve the community during the dry seasons.
- ii. Drowning of people, livestock and wildlife in the dam reservoir.
- iii. Denying livestock and wild life the right of way by fencing of the reservoir and water points.
- iv. Conflicts between wildlife and human beings.
- v. Lack of proper sanitation facilities at water points.
- vi. Increased incidences of malaria and water-borne diseases.

## Key Stakeholder

### Location and Scope of Work

Wamba Dam project is located in Samburu County within Wamba Forest Station in the Forest Reserve. The project will affect 22.88Ha of Mathews Range Forest with a coverage area of 93,765.50 ha. This translates to 0.024 % of the forest cover to be affected by the project. The proportion of forest cover occupied by the dam is too small as a result, there shall be insignificant negative impact on the forest ecosystems. The table below summarizes the area requirement for the project component.

S/N	Component name	Forest Area in Hectares	Area to be affected in Hectares	% age of forest to be affected
1.	Dam	93,765.50	15.68	0.0167
2.	Treatment Works		4.2	0.004
3.	3Km Treated Water Pipeline,		3.0	0.003
<b>Total</b>			<b>22.88</b>	<b>0.024</b>

The project is being implemented by the Northern Water Services Board with Bitat Limited as the project contractor.

Construction works of Phase I commenced on 16<sup>th</sup> November, 2017 and is expected to be completed on 16<sup>th</sup> November, 2018 at a contract sum of Kshs. 106Million. The project is at 45% completion and is intended to supply potable and adequate water to 7,020 residents of Wamba Town and its environs upon completion.

The scope of work for Phase I entail construction of a 15m high zoned rock fill coffer dam of capacity 257,335.25m<sup>3</sup> including 3km access road. Phase II will entail construction of the main dam of capacity 3,714,985m<sup>3</sup>.

### Joint Review

In April, 2018, a Joint Ministerial Technical Team whose members were Ministry of Water and Irrigation and Ministry of Environment and Forest to explore special appeal raised by Ministry of Water for exemption from specific provisions of the moratorium on logging in public and community forests.

The task force recommended exemption of construction of four dams in public forest among them Wamba mega Dam.

The Ministry was requested to proceed with construction provided it pays Kshs 1.3million and implement the EMP contained in this Report which has been approved by KFS

## K. CONCLUSION

Though the EIA Study has identified impacts on flora and fauna in the short time, the construction of Wamba Mega Dam has been found to have major impacts on flora, fauna and residents of Wamba Town hence the need to construct the dam as priority and encounter the climate change effect which are threatening to get out of hand as witnessed in most part this

year during January to march where most rivers dried and the little that flowed becomed a congregation of human and wildlife.

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## ABBREVIATIONS AND ACRONYMS

Abbreviation/ Acronym	Description
asl	Above sea level
BOQ	Bill of Quantities
Cap	Chapter
Cts	Cents
DAO	District (sub-county) Agricultural Officer
DEO	District (sub-county) Environment Officer
DFO	District (sub-county) Forest Officer
DMOH	District (sub-county) Medical Officer of Health
DPHO	District Public Health Officer
DWO	District Water Officer
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Co-ordination Act
EMP	Environmental Management Plan
GoK	Government of the Republic of Kenya
GPS	Global Positioning System
HIV/AIDS	Human Immuno-Deficiency Virus/Acquired Immuno-Deficiency Syndrome
Km	Kilometres
Ksh	Kenya Shillings
M	Metres
MCA	Member of County Assembly
mm	Millimeters
M <sup>2</sup>	Square metres
M <sup>3</sup>	Cubic metres
NEMA	National Environment Management Authority
PSV	Public Service Vehicle
SK	Survey of Kenya
STD	Subscriber Trunk Dialling
STDs	Sexually Transmitted Diseases
TOR	Terms of Reference
UTM	Universal Transverse Mercator
WRMA	Water Resources Management Authority
WRUAs	Water Resources Users Associations
O <sup>c</sup>	Degrees Celsius/Centigrade

# 1. INTRODUCTION

---

## 1.1. Background

Wamba Town is the District Headquarter of Samburu East Sub-County which was carved out of Samburu in year 2007. The town hosts several departmental heads and there is mushrooming of commercial activities which befall a sub-county headquarter like Wamba Town.

The existing spring water from Mathews Ranges is inadequate. The supply is being rationed twice weekly. The current production is estimated at 168m<sup>3</sup>/day against the water demand of 1004m<sup>3</sup>/day implying that the water coverage is estimated at 16.7% (168/1004)

Arising from the foregoing and in order to spur economic growth, Wamba Town Water Supply has to be augmented to at least satisfy the current water demand.

## 1.2. Purpose of the Project

- (d) The Total Water Demand of Wamba Town is estimated at 1,730m<sup>3</sup>/day by the year 2036.
- (e) The Ministry of Water and Irrigation Guidelines for the Design, Construction and Rehabilitation of Small Dams and Pans in Kenya dated June, 1992, table 2.1 indicates the dry spell to be assumed to be 9months.

However, due to climate change, it is recommended that the dry period be assumed to be **11months**.

Hence the storage required to provide **1,730m<sup>3</sup>/day** by year 2036 is **742,170m<sup>3</sup>** by assuming a dead storage of **30%** against current construction 257,335.25m<sup>3</sup>.

- (f) During dry spell the conflict between wildlife and human escalates since the Mathew ranges spring dry forcing wildlife to look for water in homestead.

Arising from above, construction of this dam will minimize human-wildlife conflict due to provision of water to wildlife from the dam and provide portable water to Wamba Town which is stagnating due to lack of water and spur economic growth.

## 1.3. Objectives of the Assessment

The purpose of this consultancy was to prepare an Environmental and Social Impact Assessment (ESIA) report and seek environmental license for the project from NEMA.

Specifically, the environmental and social impact assessment was aimed at the following:

- To ensure that the project development options under consideration are environmentally sound and sustainable and that any environmental consequences are recognized early in the project cycle and taken into account in project design,
- To fulfil the legal requirements as outlined in Section 58 to 69 of the Act and Regulation 7 of the EIA Regulations,
- To obtain background biophysical information of the site, legal and regulatory issues associated with the project,
- To assess and predict the potential impacts during site preparation, construction and operational phases of the project,

- To make suggestions of possible alterations to the proposed design, based on the assessment findings,
- To propose mitigation measures for the potential significant adverse environmental impacts and safety risks,
- To allow for public participation,
- To lower project cost in the long term,
- To prepare an Environmental Management and Mitigation Plan,
- To compile an EIA Project Report for submission to NEMA.

## **1.4. Assessment Methodology**

This ESIA was carried out in accordance with the procedures and protocols in the Legal Notice No. 101 of Environmental (Impact Assessment and Audit) Regulations, 2003. The assessment involved the following:

### **1.4.1. Desk Study**

The desk study mainly involved:

- Checklist that consists of a simple catalogue of environmental factors, which are compared with the activities to be developed,
- Initial meetings with the client to discuss the proposed project, including various sites and activity options under consideration,
- Collection and review of baseline data, maps, the water supply design reports and any relevant information on the existing environmental and social conditions of the project area and the influenced by the proposed development,
- Review of existing legislation, regulation and policies relevant to the proposed project,
- Review of proposed project engineering designs and construction inputs, including anticipated technical processes.

### **1.4.2. Field Investigations**

The aim of the field investigations was to verify information and data collected during the desk study and collection of any new information that may be important in the assessment of impacts and design of mitigation measures. Field investigations involved:

- Site visits of the project area and the neighbouring areas that are within the zone influenced by the project,
- Taking photographs of significant aspects to assist in describing the baseline environmental and social conditions of the project area and it's the area of influence,
- Interviews with representatives of relevant key regulatory authorities within the project area and interested and affected parties mainly within the project influence zone,
- Obtaining relevant documents from the authority such as Local government, licensing board which is within the project influence zone.

## **1.5. Need for an Environmental Impact Assessment (EIA) Report**

In fulfillment of National Environmental Management Act of 2016 (NEMA) and EIA and EA regulations of 2003, Eng. Kasabuli is undertaking ESIA for construction of Wamba Mega Dam with a

view of Augmenting Wamba Town Water Supply. The purpose of this ESIA study is to identify, predict and evaluate the impacts on the social, economic, biophysical and cultural components of the environment. Environmental Management and Co-ordination Act Chapter 387 revised in 2016 in 2<sup>nd</sup> schedule section 58 (1) (4) lists Dam Development as requiring to undergo Environmental and Social Impact Assessment.

Therefore this ESIA report describes the proposed project, the receiving environment, existing legislative framework, investigates available alternatives and develops environmental management plan to limit adverse environmental impacts.

## **1.6. Project Proponent**

The proponent is Northern Water Services Board (NWSB).

The NWSB covers an area of about 244,860km<sup>2</sup> covering almost all the arid and semi areas of the country representing about 42% of Kenya's geographical area of 582 646 km<sup>2</sup>. and consisting of Twenty Three (23) districts of Ijara, Garissa, Fafi, Laghdera, Wajir Central, Wajir South, Wajir North, Mandera West, Mandera Central, Mandera East, Moyale, Sololo, Laikipia East, Laikipia West, Laikipia North, Samburu East, Samburu West, Samburu North, Isiolo, Garbatulla, Marsabit, Chalbi and Laisamis. Ten of the Districts are located in Northern Eastern, Six in Rift Valley and Seven in Eastern Provinces.

The population of the board is about 2.0 million as projected in 2002 from the 1999 census data and has approx. 70% of the livestock in Kenya in the area. The bulk of the population resides in towns and other administrative centres.

NWSB was established under the Water Act 2002 vide Gazette Notice No. 1716 of 12<sup>th</sup> March 2004 as a state corporation reporting to the Ministry of Water and Irrigation (MWI) and subsequently launched on 7<sup>th</sup> December 2004. It has been licensed by the WASREB to provide water and sanitation services in the northern region.

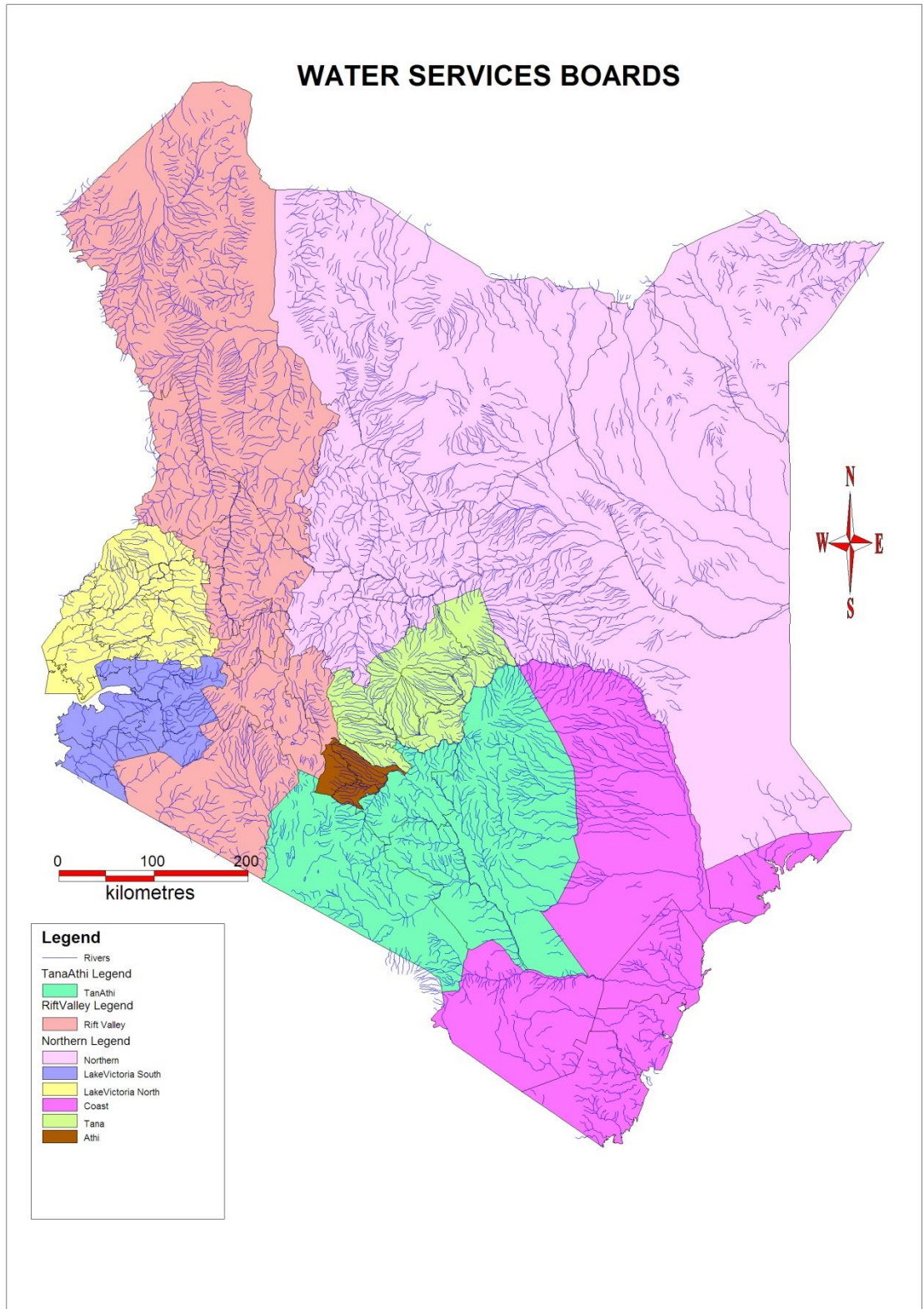
The Board's mandate is to ensure efficient and economical provision of water and sanitation services in its area of jurisdiction. However, in accordance with Section 55(1) of the Water Act 2002 the Board can only provide these services through agents known as Water Service Providers (WSPs).

The core activities of the Board are mainly:

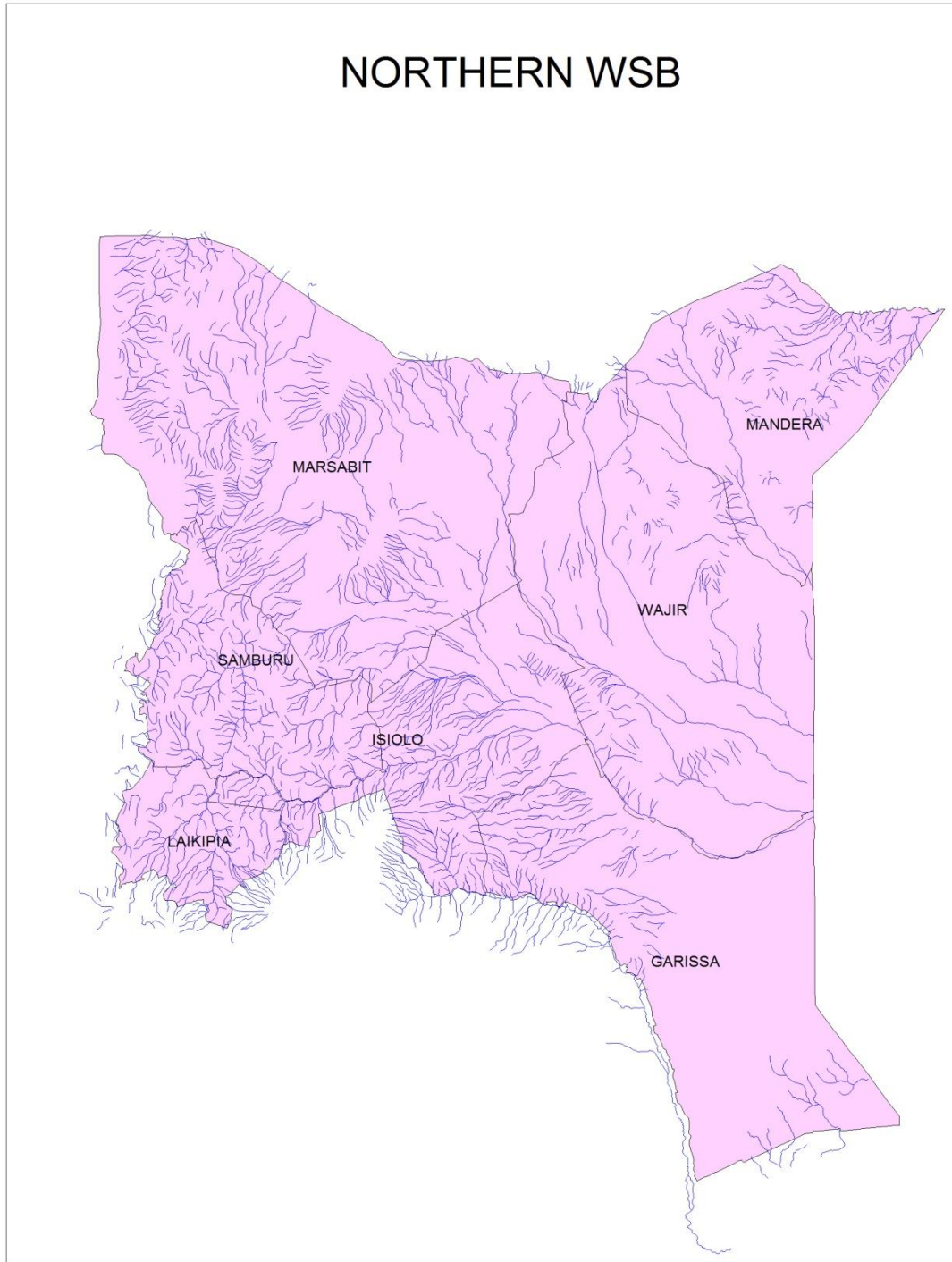
- i) Efficient and economical provision of water and sanitation services as authorized/licensed by the WASREB.
- ii) Custodian of Water Services Provision Assets.
- iii) Contracting, monitoring and enforcing agreements between WSBs and WSPs, in accordance with the regulations set by WASREB in the licenses.
- iv) Maintaining and acquiring assets, planning development and management.

Map 1-1 has the location of Northern WSB in respect to the other Boards while Map 1-2 has the administrative units.





*Map 1-1 Location of Northern Water Services Board*



Map 1-2 : Administrative County Units of Northern Water Service Board

### 1.7. Project Location

The project area is in Samburu East Sub-County, Samburu East Sub-County in Kenya. It is located in Samburu National Reserve. Wamba town is the nearest market center and is the headquarters of the Wamba administrative division and the proposed supply area.

The Sere Rongai (Wamba Mega) dam is to be constructed near Wamba town which is the headquarters of the Wamba administrative division, about 7km upstream of Wamba Town.

Wamba Town is the District Headquarter of Samburu East District which was caved out of Samburu in year 2007.

The existing spring water from Mathews Ranges is inadequate. The supply is being rationed twice weekly. The current production is estimated at  $168\text{m}^3/\text{day}$  against the water demand of  $1004\text{m}^3/\text{day}$  implying that the water coverage is estimated at 16.7% ( $168/1004$ ).

Arising from the foregoing and in order to spur economic growth, Wamba Town Water Supply has to be augmented to at least satisfy the current water demand.

The proposed project area lies on the southern part of Samburu County about 6km south-east of Wamba town. Sere Rongai River, along which the dam lies, is a tributary the Wamba River which is part of the larger Nagorumoru-Ewaso Ng'iro system. Administratively the site is located in Wamba Division, Samburu East Sub-County, Samburu County. Figure 1-1 is a map extract showing the location of the project area.

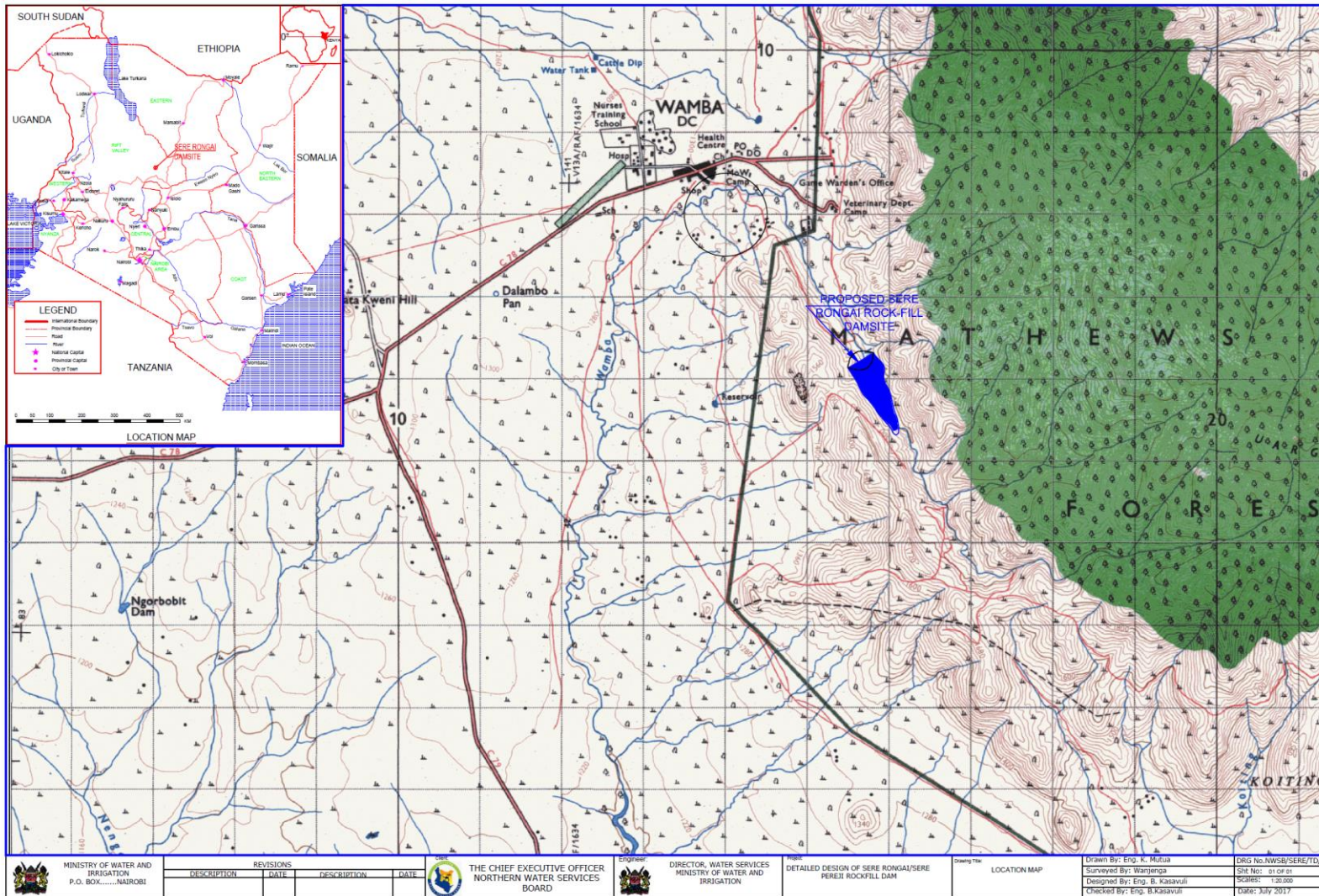


Figure 1-1: The General Project Area

EIA for Wamba Mega Dam Project | BY ENG. B.I. KASABULI -11<sup>th</sup> October 2018

## 1.8. Report Format

This report has been prepared under the following chapters:

Overview: This chapter reviews the project and summaries key findings and Conclusions of the Environmental and Impact Assessment Study.

Chapter 1: Introduction. This chapter gives the background information relevant to the project and describes the objectives and requirements of the study.

Chapter 2: Policy, legal and institutional / administrative framework. This chapter outlines the Kenya's environmental policy, legal and institutional / administrative framework relevant to the proposed project.

Chapter 3: Description of Baseline Conditions. This chapter provides a description of the existing environment in order to provide an understanding of the bio-physical and social environmental setting.

Chapter 4: Description of Proposed Project. This chapter presents the proposed interventions to achieve the project's objectives

Chapter 5: Available Alternatives -Provides available options (Alternatives).

Chapter 6: Environmental Impact Assessment: Undertakes Environmental Impact Assessment and determines the Anticipated Environmental Impacts.

Chapter 7: Environmental management plan. This chapter presents the proposed Environmental Management Plan prepared for the project.

Chapter 8: Public consultation. This chapter outlines the actions undertaken to consult stakeholders. It also presents major findings and outcomes of public consultations.

Chapter 9: Conclusions. The conclusion briefly presents the environmental and social acceptability of the project, taking into account the impacts and measures identified during the assessment process.

Annexes Gives supporting information

## 2. POLICY, LEGAL AND INSTITUTIONAL ENVIRONMENTAL STUDY FRAMEWORK

---

### 2.1. Objective

The Objective of this chapter is as follows:-

- Updates on current policy and law
- Conflicting Laws
- The Constitution 2010
- Aligned and non-aligned laws
- Regulations and procedures
- The policy and Laws to guide the expert provide direction to proponent
- OHS-state the procedures to be followed in the three project stages
- Supervision of the EMP by a qualified staff
- Monitoring and evaluating the project

### 2.2. Overview of the Policy Framework

#### 2.2.1. National Water Policy

The National Policy of Water which was promulgated in April 1999 as Sessional Paper No. 1 of 1999 calls for decentralization of operational activities from the central government to other sectors, including local authorities, the private sector and increased involvement of communities in order to improve efficiency in service delivery. It also tackles issues pertaining to water supply and sanitation facilities development, institutional framework and financing of the sector. According to the policy, in order to enable sustainable water supply and sanitation services, there is need to apply alternative management options that are participatory through enhanced involvement of others in the provision of these services but particularly the private sector.

The overall objective of the National Water Policy is to lay the foundation for the rational and efficient framework for meeting the water needs for national economic development, poverty alleviation, environmental protection and social wellbeing of the people through sustainable water resource management.

#### 2.2.2. Water Catchments Management Policies

The policy on water catchments management has been shaped over time by two Sessional Papers as listed below:

**Sessional paper No. 1 of 1968; and Kenya Forest Development Policy Sessional Paper No. 9 of May 2005**

Sessional Paper No. 9 encourages the involvement of the private sector, communities and other stakeholders" participation in forest management in order to conserve water catchments areas and reduce poverty.

#### 2.2.3. Policy on Environment and Development

This is presented as the Sessional paper No. 6 of 1999 on Environment and Development.

The overall goal is to integrate environmental concerns into the national planning and management process and provide guidelines for environmentally sustainable development. Under section 4.3 of the document, Provision of potable water and water for sanitation is viewed as being central to satisfying basic human needs. It is indicated that the current water development programmes focus almost entirely on water delivery with little concern for demand management and conservation. Water resources have an extremely high value and effective mechanisms for managing and conserving water could result into economic benefits as well as sustainable use of this vital resource.

Some of the key objectives of the policy are:

- To protect water catchments;
- To ensure all development policies, programmes and projects take environmental considerations into accounts, and
- To enhance, review regularly, harmonize, implement and enforce laws for the management, sustainable utilization and conservation of natural resources.

Under this policy, proposed water supply requires sustainable approach. The policy recommends the need for enhanced re-use/recycling of residues including water and wastewater as well as increased public awareness raising and appreciation of clean environment. It also enhances participation of stakeholders in the management of natural resources within their respective localities.

#### **2.2.4. Sessional Paper No. 3 of 2009 on National Land Policy dated August, 2009**

This Sessional Paper indicates that Kenya has not had a single and clearly defined National Land Policy since independence and identifies the problem as:-

- Existence of many land laws, some of which are incompatible, resulting in a complex land management and administration system.
- The land question has manifested itself in many ways such as fragmentation, breakdown in land administration, disparities in land ownership and poverty. This has resulted in environmental, social, economic and political problems including deterioration in land quality, squatting and landlessness, disinheritance of some groups and individuals, urban squalor, under-utilization and abandonment of agricultural land, tenure insecurity and conflict.

To address these problems, the Government embarked on the formulation of a National Land Policy through a widely consultative process with the aim of producing a policy whose vision is ***“To guide the country towards efficient, sustainable and equitable use of land for prosperity and posterity”***. Stakeholders from public, private and civil society contributed towards the policy formulation through thematic groups *based discussions*, regional workshops and written submissions. Past initiatives such as the Presidential Commission of Inquiry into the Land Law System of Kenya, the Constitution of Kenya Review Commission and the Presidential Commission of Inquiry into the Illegal/Irregular Allocation of Public Land also informed the formulation process.

This Sessional Paper has thus been formulated to provide an overall framework and define the key measures required to address the critical issues of land administration, access to land, land use planning, restitution of historical injustices, environmental degradation, conflicts, unplanned proliferation of informal urban settlements, outdated legal framework, institutional framework and information management. It also addresses constitutional issues, such as compulsory acquisition and development control as well as

tenure. It recognizes the need for security of tenure for all Kenyans (all socio-economic groups, women, pastoral communities, informal settlement residents and other marginalized groups).

The Sessional Paper designates all land in Kenya as Public, Community or Private. Most significantly, it recognizes and protects customary rights to land. It also recognizes and protects private land rights and provides for derivative rights from all categories of land rights holding. Through the Sessional Paper, the government will ensure that all land is put into productive use on a sustainable basis by facilitating the implementation of key principles on land use, productivity targets and guidelines as well as conservation. It will encourage a multi-sectoral approach to land use, provide social, economic and other incentives and put in place an enabling environment for investment, agriculture, livestock development and the exploitation of natural resources.

The institutional framework will be reformed to ensure devolution of power and authority, participation and representation, justice, equity and sustainability. Three institutions will be set up: the National Land Commission, the District Land Boards and Community Land Boards. District Land Tribunals will also be established, as will be a National Land Trust Fund to mobilize finances. Land matters may in addition be referred to the land division of the High Court. The Ministry in charge of Lands will continue performing residual roles including policy formulation and enforcement, resource mobilization, and monitoring and evaluation. Implementation of the Land Policy will require building of in-house capacity to plan, prepare and implement the policy recommendations.

## **2.3. Overview of the Legislative Framework**

### **2.3.1. The Constitution of Kenya**

The Constitution is the supreme law of the Republic and binds all persons and all State organs at all levels of government. The Constitution of Kenya, 2010 provides the broad framework regulating all existence and development aspects of interest to the people of Kenya, and along which all national and sectoral legislative documents are drawn.

In relation to the environment, article 42 of chapter four, The Bill of Rights, confers to every person 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 measures, particularly those contemplated in Article 69, and to have obligations relating to the environment fulfilled under Article 70.

Chapter 5 of the document provides the main pillars on which the 77 environmental statutes are hinged. Part 2 of this chapter directs focus on the environment and natural resources. It provides a clear outline of the state's obligation with respect to the environment, thus; the state shall:

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



There are further provisions on enforcement of environmental rights as well as establishment of legislation relating to the environment in accordance to the guidelines provided in this chapter.

## Relevance

In conformity with the Constitution of Kenya, the proposed project was undertaken in tandem with the state's vision for the national environment as well as adherence to the right of every individual to a clean and healthy environment. The proposed project is a central development activity that utilizes sensitive components of the physical and natural environment hence need for a clearly spelt out environmental management plan to curb probable adverse effects to the environment.

### **2.3.2. The Environmental Management and Co-ordination Act (EMCA), 1999 and amendment Act 2015**

This Act of Parliament, also known as EMCA, is the parent Act of Parliament that provides for the establishment of appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto.

EMCA, in its 13 interrelated parts, provides regulatory provisions for all levels of environmental conservation and management. The first four parts provide legislative guidelines on administrative and planning components of environmental management. They include:

- General Principles;
- Administration;
- Environmental planning;
- Protection and Conservation of the Environment. Parts five to seven focus on on-field management of the environment as an integral component of actual or proposed projects;
- Environmental impact assessments (EIA), audits and monitoring;
- Environmental audit and monitoring; and
- Environmental quality standards.

The last five parts of the Act regulate on enforcement of provisions outlined in the Act and recognition of international agreements along which the EMCA has been established. They are; Environmental Restoration orders, Environmental Easements, Inspection, analysis and records, Inspection Analysis and Records, International Treaties, Conventions and Agreements, National Environment Tribunal, Environmental Offences.

All the chapters 1 to 13 apply to the proposed project at one stage or the other and therefore the project proponent is required to understand and conform with the Act accordingly. One such area is Environmental Impact Assessment. This is expressly stated in section 58(2) of the Act. *“The proponent of a project shall undertake or cause to be undertaken at his own expense an Environmental Impact Assessment study and prepare a report thereof where the authority, being satisfied, after studying the project report under subsection (1), that the intended project may or is likely to have or will have a significant impact on the environment, so directs.”*

EMCA has set out several regulations for managing the environment which include the following:

### **A. The Environmental (Impact Assessment and Audit) Regulations, 2003**

This is a supplementary legislation to the EMCA. It gives additional “punch” by providing guidelines for conducting Environmental Impact Assessments and Audits. It offers guidance on the fundamental aspects on which emphasis must be laid during field study and outlines the nature and structure of Environmental Impact Assessments and Audit reports. The legislation further explains the legal consequences of partial or non-compliance to the provisions of the Act.

#### **Relevance**

The proposed water supply project as an activity is listed in the second schedule of EMCA as among projects that require an Environmental Impact Assessments before commencement. The project implementation cannot commence before the license is granted, upon conducting the EIA. For this reason, this report provides the legal requirements for the project approval. Impacts of the proposed project, involves major elements of the environment, including land, water and human health and safety. Therefore, there is need to evaluate these impacts and establish the most sustainable approach to benefit both the current and the future generations and mitigate projected negative impacts to people and the environment through conducting Environmental and Social Impact Assessment and subsequent audits.

### **B. The Environmental Management and Coordination (Water Quality) Regulations, 2006**

Described in Legal Notice No. 120 of the Kenya Gazette Supplement No. 68 of September 2006, these regulations apply to drinking water, water used for industrial purposes, agricultural purposes, recreational purposes fisheries and wildlife and any other purposes. It stipulates quality standards for sources and discharge of water to any environmental receptors within an activity area. The Regulations outline various water quality standards in relation to use and discharge. Such aspects provided for are:

- Quality standards for sources of domestic water,
- Quality monitoring for sources of domestic water,
- Standards for effluent discharge into the environment,
- Monitoring guide for discharge into the environment,
- Standards for effluent discharge into public sewers, and
- Monitoring for discharge of treated effluent into the environment.

#### **Relevance**

The proposed water supply project will impound and abstract significant quantity of surface water. It is thus fundamental to regularly analyze water quality and check for conformity to stipulated legal standards in this supplementary legislation. Moreover, the quality of water discharges into any environmental receptor must be ascertained for safety and if not, treated.

### **C. Environmental Management and Co-ordination (Waste Management) Regulations, 2006**

Regulations guiding waste management are described in Legal Notice No. 121 of the Kenya Gazette Supplement No. 69 of September 2006. They offer legal provisions on handling of a variety of wastes emanating from various projects and activities. The waste categories covered by the regulations include:

- Industrial wastes,
- Hazardous and toxic wastes,
- Pesticides and toxic substances,
- Biomedical wastes, and
- Radio-active substances.

These Regulations outline requirements for handling, storing, transporting, and treatment / disposal of all waste categories as provided therein.

#### **Relevance**

The proposed project, during construction phase may involve the use of materials that release hazardous waste i.e. cement, oil spillage from vehicles, hence the need for all project actors to abide by these regulations in dealing with such wastes, especially the wastes emanating from water treatment works which may be handled in the course of the project life.

#### **D. Environmental Management and Coordination (Fossil Fuel Emission Control) Regulations 2006**

These regulations are described in Legal Notice No. 131 of the Kenya Gazette Supplement No. 74 of October 2006 and will apply to all internal combustion engine emission standards, emission inspections, the power of emission inspectors, fuel catalysts, licensing to treat fuel, cost of clearing pollution and partnerships to control fossil fuel emissions.

#### **Relevance**

The fossil fuels considered are petrol, engine oil and diesel. This will be applicable to equipment and machinery used in the project during construction phases of the project.

#### **E. Environmental Management and Coordination (Noise and Excessive Vibration Pollution) Control Regulations, 2009**

These Regulations prohibit making or causing any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

#### **Relevance**

Under the regulation the contractor is prohibited from producing excessive noise and vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment or excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30 meters from any moving source. Under the regulation the Contractor will be required to undertake daily monitoring of the noise levels within the project area during construction period to maintain compliance.

### **2.3.3. Water Act, 2016**

These Regulations are described in the Kenya Gazette Supplement No.164 of 20th September, 2016. The Act has 10 different parts as follows:-

- Part 1: Preliminary
- Part 2: Ownership, Use and Management of Water Resources
- Part 3: Regulation of the Management and Use of Water Resources
- Part 4: Water Services
- Part 5: Water Sector Trust Fund
- Part 6: Dispute Resolution
- Part 7: Financial Provisions
- Part 8: General Provisions
- Part 9: Transitional Provisions
- Part 10: Schedules

According to the Act, Water in Kenya is owned by the National Government, subject to any right of the user, legally acquired. However; this Act regulates conservation and management of all water resources within the republic, and related purposes. In clause 5 of part II, it states that every water resource is vested in and held by the national government in trust for the people of Kenya.

Clause 6 roots for establishment of an agent of national government and will regulate the management and use of water resource.

Part 3 establishes the Water resources Authority to be the agent of national government to regulate the management and use of the water resource.

#### **A. The Water Resources Management Rules, 2007**

As a subsidiary to the Act, a legislative supplement, The Water Resources Management Rules, 2007 was gazetted to guide all policies, plans, programmes and activities that are subject to the Water Act, 2016. The Water Resources Management Rules empower Water Resources Management Authority (WRMA) to impose management controls on land use falling under riparian land.

Water demand is the sole driving factor in the abstraction of river water for the proposed project. In the proposed project, surface water will be the main source of water whose abstraction must comply with the provisions and legal procedures in this Act. The Act will thus play a central role in guiding the exploitation of the water resource throughout the project life.

#### **2.3.4. Occupational Health and Safety Act, 2007**

The OSHA was enacted to provide for the health, safety and welfare of persons employed in workplaces, and for matters incidental thereto and connected therewith. The proposed project will be undertaken in compliance with the 2007 (OSHA) during the construction and operational phases.

#### **A. The Safety and Health Committee Rules, 2004**

These rules came into effect on 28 April 2004 and require that an Occupier formalise a S&H Committee if there is a minimum of 20 persons employed in the work place. The size of the S&H Committee will depend on the number of workers employed at the place of work. For the Proponent and Contractor, the OSHA and the S&H Committee Rules 2004 are important as they require compliance with the following measures:

- Posting of an Abstract of the Factories and Other Places of Work Act in key sections of each area of the factory or other workplace,
- Provision of first aid boxes in accordance with Legal Notice No. 160 of 1977,
- Ensuring that there are an appropriate number of certified first aiders trained by an approved institutions and that the certification of these first aiders is current.

Provision of a General Register for recording amongst other things all incidents, accidents and occupational injuries;

- Appointment of S&H Committee made up of an equal number of members from management and workers based on the total number of employees in the workplace,
- Training of the S&H Committee in accordance with these rules,
- Appointment of S&H management representative for the Proponent.

## **B. Medical Examination Rules 2005**

These rules provide for Occupiers to mandatorily undertake pre-employment, periodic and termination medical evaluations of workers whose occupations are stipulated in the Second Schedule of the OSHA and the First Schedule of the above Regulation. Workers that fall under the above two schedules are required to undergo medical evaluations by a registered medical health practitioner duly registered by the DOSHS.

It will be incumbent on the Contractor to ensure that Material Safety Data Sheets (MSDSs) for chemicals used in the construction phase are studied for toxicological and epidemiological information and workers trained on their safe handling, use and disposal. If any of these products present negative impacts to human health, the workers exposed to the chemicals will be required to undergo medical examinations in accordance with the above Rules.

## **C. Noise Prevention and Control Rules 2005**

These rules were promulgated on 10 March 2005 for occupational noise exposure and apply to workplaces in Kenya. The regulation is applicable to the project as noise potentially generated by construction equipment may exceed the permissible occupational noise levels given below.

The rules set the permissible level for occupational noise in any workplace (including construction sites) as follows:

- 90 dB (A) over an 8-hour TWA period over 24-hours, and
- 140 dB (A) peak sound level at any given time.

Additionally, the rules set permissible limits for community noise levels emanating from a workplace as follows:

- 50 dB (A) during the day; and 45 dB (A) at night.

If noise levels exceed the above permissible levels, the Occupier is required to develop, rollout and implement a written hearing conservation program which should include the following sections as a minimum:

- Undertaking a Noise Level Survey,
- Education and training of persons affected by excessive noise,
- Engineering noise control methods,
- Hearing protection requirements,
- Posting of notices in noisy areas,
- Audiometric testing methods and frequencies for those exposed to high noises; and
- Annual program review.

The Proponent is to ensure that any equipment brought to a site in Kenya for use shall be designed or have built-in noise reduction devices.

## **D. The Factory and Other Places of Work (Medical Examination) Rules, 2005**

This supplementary legislation covers workers who are exposed to specific occupational hazards for the purpose of preventing or controlling occurrence of occupational diseases. In the first schedule of the legislation, works involving risks to healthcare are listed and recommended examinations and their respective intervals are indicated for adherence by employers or company directors. Sample requisite certifications are also provided for employers.

## **Relevance**

All persons employed will be required to undergo pre-employment and periodic medical examinations to ascertain their fitness and also to maintain their health and safety at the workplace. Examinations certificates will be required on regular basis, hence the need for adherence.

### **2.3.1. The Public Health Act (Cap 242)**

This Act makes provision for securing and maintaining health. Part III and IV of the Act focuses on notification, prevention and suppression of infectious diseases, including inspection, disinfection and provision of medical aid to affected parties in case of outbreaks of infectious diseases. Part IX regulates on sanitation and housing, granting health authorities powers to prevent or remedy any dangers to health arising from poor handling of sanitation issues as well as improper housing and nuisances arising there from. Besides, regulations governing prevention and destruction of mosquitoes, encompassing due maintenance of yards, premises, wells, cesspits and identification and destruction of breeding places are entailed in part XII.

## **Relevance**

Sanitation, housing, disease outbreaks and communal resource sharing are obvious issues in construction projects. The Public Health Act provides the necessary legal guidelines regulating measures aimed at effective control and management of the said issues.

### **2.3.2. The Standards Act CAP 496 and the Standard Amendment Act 2004**

The Act empowers the Kenya Bureau of Standards to promote standardization through the Government or the representatives of any industry or with any local Authority or other public body or any other person, with a view to securing the adoption and practical application of standards.

### **2.3.3. Land Question**

There are at least 5 Acts relevant to the project and governing the land question as below:-

#### **A. Land Act, 2012**

This Act is described in Kenya Gazette Supplement No. 37(Acts No. 6) dated 2nd May, 2012. This Act deals with the administration and management of Public, Community and Private land. It is an act of parliament which give effect to article 68 of the Constitution, to revise, consolidate and rationalize land laws. It provides for the sustainable administration and management of land and land based resources, and for connected purposes. In Part VII, the act provides a framework of compulsory acquisition of interest land. Part X on easements and analogous rights specifies how National Land Commission can create public right of way where need arises.

#### **B. The land Registration Act, 2012**

It is detailed in Kenya Gazette Supplement No. 33 (Acts No. 3) of 2nd May 2012. Generally, it deals with registration of land for issuance of titles.

### **C. The National Land Commission Act, 2012**

This act is spelt in Kenya Gazette supplement No. 36 (Acts No. 5). The act was assented on 27th April, 2012 and commenced operation 2nd may, 2012. The object and purpose of this Act is to provide;

- a) For the management and administration of land in accordance with the principles of land policy set out in Article 60 of the Constitution and the national land policy,
- b) For the operations, powers, responsibilities and additional functions of the Commission pursuant to Article 67 (3) of the Constitution,
- c) A legal framework for the identification and appointment of the chairperson, members and the secretary of the Commission pursuant to Article 250 (2) and (12) (a) of the Constitution, and
- d) For a linkage between the Commissions, county governments and other institutions dealing with land and land related resources.

Functions of the Commission are:-

(1) Pursuant to Article 67(2) of the Constitution, the functions of the Commission sare :-

- 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.

(2) In addition to the functions set out in subsection (1), the Commission, in accordance with Article 67 (3) of the Constitution

- a) On behalf of, and with the consent of the national and county governments, alienate public land,
- b) Monitor the registration of all rights and interests in land,
- c) Ensure that public land and land under the management of designated state agencies are sustainably managed for their intended purpose and for future generations,
- d) Develop and maintain an effective land information management system at national and county levels,
- e) Manage and administer all unregistered trust land.

### **D. The Way leaves Act, Chapter 292 of the laws of Kenya**

Clause 3 requires the Government to pass pipeline in private property provided there is no interference to existing building. Clause 4 requires the Government to notify the owner for such an action through Kenya Gazette or other approved methods Clause 6 requires the Government to compensate the owner where the way leave is taking place.

## E. Physical Planning Act ( Cap 286)

The Local Authorities are empowered under section 29 of the Act to reserve and maintain all land planned for open spaces, parks, urban forests and green belts. The same section, therefore allows for the prohibition or control of the use and development of land and buildings in the interest of proper and orderly development of an area.

### 2.3.4. The Kenya Forest Act, 2005

Lays ground in the manner the Forest is administered and creates Kenya Forest Service. The act also advocates for community participation.

#### A. The Forest (Fees and Charges Regulations, 2016)

This act is specified in Kenya Gazette Supplement No. 16 dated 26th February, 2016 (Legal Notice No. 21). Advocates for specific charges related to the forest entry and product. This means the proponent will pay Kshs 350,000 to be allowed by Kenya Forest Service to put up the dam inside forest reserve. The relevant Fees are as per table 2-1 below.

Table 2-1: Fees Charged for undertaking Water Works in Gazetted Forest

Activities		Price(Ksh.)
Water reservoirs	For commercial consumption - Large ( Annual )	50,000
	For commercial consumption - (Small Annual )	20,000
	Small dam-Up to 1 million cubic meters	350,000
	Large dam-More than one million cubic metres	1,000,000
Water abstraction	Water easement (once)	15,000
	Small way leave-Up to one metre diameter (Per kilometre)	5,000
	Large wayleave-More than one metre diameter (Per kilometre)	20,000
	Borehole (Annual)	50,000
	Monitoring boreholes (Annual)	50,000
Fish farming (Annual License)	Fish farming (Fresh water)- 300m <sup>2</sup>	30,000
	Fish farming (Fresh water)- Larger than 300m <sup>2</sup>	100,000
Aquaculture (Annual License)	Aquaculture (Marine)- Large	75,000
	Aquaculture ( Marie )- Small	20,000
Grazing	Cattle (Per month )	100
	Sheep (Per month )	40
Transmitters and transceivers	Mobile phones firms ( Annual )	250,000
	Radio station ( Annual )	150,000
	Internet	150,000



Activities		Price(Ksh.)
	TV stations ( Annual )	250,000
Annual Licenses	General Forest Licence	10,000
	Small sawmill ( Less than 10 m <sup>3</sup> )	30,000
	Medium sawmill (between)	45,000

### 2.3.5. Wildlife (Conservation and Management) Act (Cap 376)

Is very close to the Forest Act but covers mainly National Parks, National Reserves and Sanctuaries. Limitations are on the rights of use by landowners, and wildlife utilization.

Section 3(1) Part II-Administration establishes the Kenya Wildlife Service. Section 3A defines the function of Kenya Wildlife as:-

- a) Formulate policies regarding the conservation, management and utilization of all types of fauna (not being domestic animals) and flora,
- b) Advise the Government on establishment of National Parks, National Reserves and other protected wildlife sanctuaries,
- c) Manage National Parks and National Reserves,
- d) Prepare and implement management plans for National Parks and National Reserves and the display of fauna and flora in their natural state for the promotion of tourism and for the benefit and education of the inhabitants of Kenya,
- e) Provide wildlife conservation education and extension services to create public awareness and support for wildlife policies,
- f) Sustain wildlife to meet conservation and management goals,
- g) Conduct and co-ordinate research activities in the field of wildlife conservation and management,
- h) Identify manpower requirements and recruit manpower at all levels for the Service for wildlife conservation and management,
- i) Provide advice to the Government and local authorities and landowners on the best methods of wildlife conservation and management and be the principle instrument of the Government in pursuit of such ecological appraisals or controls outside urban areas as is necessary for human survival,
- j) Administer and co-ordinate international protocols, conventions and treaties regarding wildlife in all its aspects in consultation with the Minister,
- k) Solicit by public appeal or otherwise, and accept and receive subscriptions, donations, devises and bequests (whether movable or immovable property and whether absolute or conditional) for the general or special purposes of the Service or subject to any trust; (l) render services to the farming and ranching communities in Kenya necessary for the protection of agriculture and animal husbandry against destruction by wildlife.

First Schedule defines Game Animals, second schedule defines Game birds, third schedule defines protected area while Fourth schedule gives the rank of Game Wardens.

## 2.4. Institutional Framework

New project developments can have major impacts on the environment including soil degradation, altering landscapes and destroying natural habitats. Other problems associated with development and human

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activity include land use conflicts, human and animal conflicts, water management and environmental pollution. In addition to harming the environment, these impacts can and do have significant economic costs and negatively affect human health.

In cognizance of this, the Government of Kenya has established a number of institutional and administrative entities to ensure adequate management of associated concerns and eventualities. The following are the main institutions that perform the regulatory role and are relevant to the project.

#### **2.4.1. Ministry of Water and Irrigation**

The mandate is formulation, review and implementation of policy on the water sector. The functions include:

- a) Water harvesting and storage infrastructure for water conservation, which will help in mitigating droughts and famine,
- b) Catchments area conservation,
- c) Water resources management policy,
- d) Urban and rural water development and supply,
- e) Waste water treatment and control,
- f) National water conservation and Pipeline Corporation, and
- g) Flood preparedness and management to cope with and mitigate the impacts.

Water quality and pollution control by adopting the "Polluter Pays" principles in order to ensure water user responsibility.

#### **A. The Water Resource Management Authority (WRMA) powers and functions: The Authority shall have the following**

- a) To develop principles, guidelines and procedures for the allocation of water resources,
- b) To monitor, and from time to time reassess, the national water resources management strategy,
- c) To receive and determine applications for permits for water use,
- d) To monitor and enforce conditions attached to permits for water use,
- e) To regulate and protect water resources quality from adverse impacts,
- f) To manage and protect water catchments; in accordance with guidelines in the national water resources management strategy, to determine charges to be imposed for the use of water from any water resource,
- g) To gather and maintain information on water resources and from time to time publish forecasts, projections and information on water resources,
- h) To liaise with other bodies for the better regulation and management of water resources, and
- i) To advise the Minister concerning any matter in connection with water resources.

Water Service Boards (WSB); The Boards have the following mandate:

- Strengthen the institution and build its capacity,
- Provide water and sanitation services in an efficient, effective, affordable and sustainable manner,
- Increase access and availability of water and sanitation services,
- Strengthen communication with stakeholders, and

- Mainstream good corporate governance, gender, and HIV/AIDS awareness campaign in all core activities.

#### **2.4.2. Ministry of Environment and Natural Resources**

This is the state office in charge of all issues affecting, and affected by, the environment and all its components. The Ministry's mandate includes the following;

- a) Environment and Natural Resources Policy formulation, analysis and review,
- b) Sustainable management of Mineral resources and conservation of environment,
- c) Continuous development of geo-database for integrated natural resources and Environmental management systems,
- d) Conduct applied research and dissemination of research findings in land resources and geology,
- e) Carry out geological surveys, mineral exploration and regulation of mining and use of commercial explosives,
- f) Promote, monitor and coordinate environmental activities and enforce compliance of environmental regulations and guidelines, and
- g) Meteorological services.

#### **Relevance**

Water resources, land, flora and fauna and the air are core components of the natural environment. The proposed project will utilize all these resources at one stage or another. Any extractive or depository uses of the resources are guided by the various programmes and regulations under the ministry and consistent consultative partnerships, including adherence to relevant legal provisions will be required in the entire course of the project.

#### **A. The National Environment Management Authority**

The authority is mandated to carry out, among others, the following activities in the sector:

- a) Promote the integration of environmental considerations into development policies, plans, programmes and projects, with a view to ensuring the proper management and rational utilization of environmental resources, on sustainable yield basis, for the improvement of the quality of human life in Kenya,
- b) Undertake and coordinate research, investigation and surveys, collect, collate and disseminate information on the findings of such research, investigations or surveys,
- c) Identify projects and programmes for which environmental audit or environmental monitoring must be conducted under this Act,
- d) Initiate and evolve procedures and safeguards for the prevention of accidents, which may cause environmental degradation and evolve remedial measures where accidents occur e.g. floods, landslides and oil spills, and
- e) Undertake, in cooperation with relevant lead agencies, programmes intended to enhance environmental education and public awareness, about the need for sound environmental management, as well as for enlisting public support and encouraging the effort made by other entities in that regard.

#### **Relevance**

Render advice and technical support, where possible, to entities engaged in natural resources management and environmental protection, so as to enable them to carry out their responsibilities satisfactorily.

## **B. Kenya Forest Service**

Kenya Forest Service is a corporate body established under the Forest Conservation and Management Act no 34 of 2016 (henceforth referred to as the Act). The Kenya Forest Service is an agency of the Government of Kenya designated by the Forest Act of 2005 as the replacement for the old Forest Department. It is overseen by the Board of the Kenya Forest Service. The functions of the Service are –

- a) Conserve, protect and manage all public forests in accordance with the provisions of this Act,
- b) Prepare and implement management plans for all public forests and, where requested, assist in preparation of management plans for community forests or private forests in consultation with the relevant owners,
- c) Receive and consider applications for licenses or permits in relation to forest resources or management of forests or any other relevant matter in accordance with this Act,
- d) Establish and implement benefit sharing arrangements in accordance with the provisions of this Act,
- e) Assist county governments to build capacity in forestry and forest management in the counties,
- f) In consultation with relevant stakeholders, develop programmes for tourism and for recreational and ceremonial use of public forests,
- g) Promote forestry education and training,
- h) Register and maintain a register of all forest management plans prepared for public forests,
- i) Collaborate with relevant persons in identifying research needs and applying research findings in relation to forests and forestry,
- j) Manage water catchment areas in relation to soil and water conservation, carbon sequestration and other environmental services in collaboration with relevant stakeholders.

## **C. Kenya Wildlife Service**

The KWS conserves and manages Kenya's wildlife for the Kenyan people and the world. It is a state corporation established by an Act of parliament. The KWS is a State corporation established by an Act of Parliament, Wildlife (Conservation and Management) CAP 376 with the mandate to conserve and manage wildlife in Kenya, and to enforce related laws and regulations. The Act spells out the functions of KWS as follows:

- a) Formulating policies and guidelines for conservation, management and utilization of all types of fauna and flora, excluding domestic animals,
- b) Stewardship of national parks and reserves, including security for visitors and wildlife within and outside protected areas,
- c) Providing advice to the national government, county government, and land owners on best methods of wildlife conservation and management,
- d) Mandated to license, control and supervise all wildlife conservation and management activities outside protected areas,
- e) Providing wildlife conservation education and extension services to create public awareness,
- f) Conducting and coordinating research activities in the field of wildlife conservation and management and disseminate information,
- g) Capacity building for wildlife conservation and management,
- h) Administering and coordinating international protocols, conventions and treaties regarding wildlife in all its aspects KWS manages approximately 8 % of the total land mass in Kenya that consists of 23

national Parks, 31 national reserves and 6 national sanctuaries, 4 marine national parks and 6 marine national reserves. There are also 154 field stations for management of wildlife outside the protected areas.

Water: KWS is directly responsible for conserving three of the five critical water towers in Kenya namely Mt. Kenya, Aberdare and Mt. Elgon. The organisation is also involved in protecting and restoring the Mau forest in collaboration with other national agencies.

### **2.4.3. Ministry of Lands**

Land is the foundation upon which all activities are based hence its effective management is important for social, economic and political development of Kenya. It is against this background that the Ministry of Land is charged with the responsibility of ensuring efficient administration and sustainable management of the land resource. The Ministry of Lands is the main Government institution charged with the responsibility of ensuring proper land administration and management. It comprises of five departments namely: Lands, Surveys, Physical Planning, Land Adjudication and Settlement and Administration and Planning.

#### **Mandate**

The core mandate of the Ministry is to manage and administer the land resource through the following functions:

- Development and Implementation of policies on land,
- Spatial planning and regulation,
- Generation, maintenance and dissemination of accurate geographical data,
- Ascertainment and recording of rights and interests on land,
- Settlement of poor landless Kenyans,
- Secure land tenure,
- Property valuation for various purposes,
- Administration of Government and Trust Land,
- Management of Land Information and records,
- Ensuring sustainable land use.

#### **A. National Land Commission (NLC)**

This is an institution charged with compulsory acquisition of Private and for Public Projects.

## **2.5. INTERNATIONAL CONVENTIONS AND TREATIES**

Kenya is a party to sixteen International Environmental Treaties. These are:-

- a) Convention on Biological Diversity (CBD),
- b) African Convention on the Conservation of Nature and Natural Resources,
- c) Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (Nairobi Convention),
- d) Vienna Convention for the protection of the Ozone Layer,
- e) Montreal Protocol and (London Amendment) on substances that deplete the Ozone Layer
- f) Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention),
- g) Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES),
- h) Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention or CMS),

- i) Convention of the Prevention of Marine Pollution by Dumping of Wastes and other matter (as amended),
- j) International Convention for the Prevention of Pollution from Ships,
- k) United Nations Convention on the Law of the Sea (UNCLOS),
- l) Lusaka Agreement on Cooperative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora (Lusaka Agreement),
- m) United Nations Convention to Combat Desertification in those countries Experiencing serious Drought and/or Desertification, particularly in Africa,
- n) Convention concerning the Protection of the World Cultural and Natural Heritage,
- o) Convention for the Establishment of the Lake Victoria Fisheries Organization,
- p) United Nations Framework Convention on Climate Change,
- q) The applicable International Conventions and Treaties include,
- r) The Ramsar Convention on wetland of International Importance of 1971. This convention is important as the abstraction of water will have effect on riverine and wetlands,
- s) The convention on Biological Diversity of 1999 is important because the water project will impact on flora and fauna. The project implementation should take into account the uniqueness of the various ecological zones, while avoiding the environmentally sensitive areas,
- t) United Nations Framework Convention on Climate Change since the area is already witnessing climate change,
- u) United Nations Convention to Combat Desertification in those countries Experiencing serious Drought and/or Desertification, particularly in Africa due to its locality, and
- v) South East Mau Forest Reserve is both a Gazetted Forest and Wildlife Sanctuary which is rich in Biological Diversity. Further, part of the project is going to be located in South East Mau Forest.

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In view of the above, this will trigger the following International Conventions:-

- African Convention on the Conservation of Nature and Natural Resources.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention or CMS),
- Lusaka Agreement on Cooperative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora (Lusaka Agreement),
- Convention concerning the Protection of the World Cultural and Natural Heritage, and
- United Nations Framework Convention on Climate Change.

### **2.5.1. The Ramsar Convention**

The Convention on Wetlands of International Importance especially as Waterfowl Habitat. Sometimes known as the Ramsar Convention from its place of adaption in 1971 in Iran, is an Intergovernmental treaty which provides the framework for international cooperation for the conservation of wetland habitats.

Because wetlands are very important for ecological processes as well as for their rich flora and fauna, the broad objectives of the convention are to stem the loss of wetlands and to ensure their conservation. To meet these objectives, the convention places general obligations on contracting parties relating to the conservation of wetlands throughout their territory and special obligations pertaining to those wetlands which have been designated in a list of wetlands of International Importance.

The Convention entered into force in late 1975 following the accession of the seventh party, Greece. It now has contracting parties from all regions throughout the world.

### **2.5.2. The Convention on Biological Diversity of 1999**

Biodiversity refers to the infinite variety of life forms; genetic diversity – variation of genes within individual species, species diversity – variety of species in flora and fauna, and ecosystem diversity – variety of ecosystems, such as rainforests, coral reefs and deserts, that exist on our planet. This biological diversity is the *sine qua non* for the resilience of ecosystems and life forms and their ability to prevent and to recover from disasters and adverse conditions. Activities of microbial and animal species lead to soil creation, the maintenance of its quality and detoxification and decomposition of wastes. Appropriate plant cover can prevent catastrophic inundations, landslides and avalanches, mitigates soil erosion, and contributes to air and water quality, as well as to climate stabilization. The maintenance of species diversity facilitates natural pest control, pollination, crop production and food security. Furthermore, biological diversity plays an important role in the spiritual and cultural life of human societies.

The Convention on Biological Diversity is probably the most all-encompassing international agreement ever adopted. It seeks to conserve the diversity of life on Earth at all levels - genetic, population, species, habitat, and ecosystem - and to ensure that this diversity continues to maintain the life support systems of the biosphere overall. It recognizes that setting social and economic goals for the use of biological resources and the benefits derived from genetic resources is central to the process of sustainable development, and that this in turn will support conservation.

The Convention on Biological Diversity was negotiated under the auspices of the United Nations Environment Programme (UNEP). It was opened for signature at the June 1992 UN Conference on Environment and Development (UNCED) and entered into force on 29 December 1993, ninety days after the 30th ratification. As of October 1998, more than 170 countries including Kenya had become Parties. The three goals of the CBD are to promote the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising out of the utilization of genetic resources. The CBD Secretariat is located in Montréal, Canada.

The Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), which advises the Conference of the Parties (COP), meets several months prior to each COP. Negotiations on the first protocol to the Convention, conducted by the *Ad Hoc* Working Group on Biosafety (BSWG), concluded in January 2000. The *Earth Negotiations Bulletin* has covered each COP, SBSTTA and BSWG session plus two sessions prior to the CBD's entry into force and an intersessional workshop. *ENB* coverage of biodiversity issues also includes several sessions of the Commission on Plant Genetic Resources for Food and Agriculture, which meets under FAO auspices (see the *ENB* CBD Archives for all biodiversity coverage; see also the linkages

Homepage on Genetic Resources). The following discussion focuses on decisions taken by the CBD COP, SBSTTA and the BSWG.

### **2.5.3. African Convention on the Conservation of Nature and Natural Resources**

The African Convention on the Conservation of Nature and Natural Resources is a continent-wide agreement signed in 1968 in Algiers. It supersedes the Convention Relative to the Preservation of Fauna and Flora in their Natural State of 1933 and has been superseded by the African Convention on Conservation of Nature and Natural Resources (revised) signed in Maputo in 2003. There are 42 Countries which have signed the convention while 30 have ratified.

The Contracting States undertake to adopt the measures necessary to ensure the conservation, utilisation and development of soil, water, floral and faunal resources in accordance with scientific principles and with due regard to the best interests of the people (art. II). They agree to take effective measures to conserve and improve the soil and to control erosion and land use (art. IV). Furthermore, they are to establish policies to conserve, utilise and develop water resources, prevent pollution and control water use (art. V). Parties also undertake to protect flora and ensure its best utilization, the management of forests and control of burning, land clearance and overgrazing (art. VI). They are to conserve faunal resources and use them wisely, manage populations and habitats, control hunting, capture and fishing, and prohibit the use of poisons, explosives and automatic weapons in hunting (art. VII). Protected species in list A enjoy full total protection, while those in list B may be taken only with authorization (art. VIII). Traffic in trophies is to be tightly controlled, to prevent trade in illegally killed and obtained trophies (art. IX). Conservation areas are to be established and maintained (art. X), while customary rights are to be reconciled with the Convention (art. XI). Conservation education is to be undertaken at all levels (art. XIII) and conservation and ecological factors are to be considered in development plans (art. XIV). Parties undertake to cooperate wherever necessary in implementing the Convention (art. XVI). The Organization of African Unity (now the African Union) is to carry out the function of Secretariat to the Convention. Regular meetings of the parties are not provided for.

### **2.5.4. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)**

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

Widespread information nowadays about the endangered status of many prominent species, such as the tiger and elephants, might make the need for such a convention seem obvious. But at the time when the ideas for CITES were first formed, in the 1960s, international discussion of the regulation of wildlife trade for conservation purposes was something relatively new. With hindsight, the need for CITES is clear. Annually, international wildlife trade is estimated to be worth billions of dollars and to include hundreds of millions of plant and animal specimens. The trade is diverse, ranging from live animals and plants to a vast array of wildlife products derived from them, including food products, exotic leather goods, wooden musical instruments, timber, tourist curios and medicines. Levels of exploitation of some animal and plant species are high and the trade in them, together with other factors, such as habitat loss, is capable of heavily depleting their populations and even bringing some species close to extinction. Many wildlife species in trade are not endangered, but the existence of an agreement to ensure the sustainability of the trade is important in order to safeguard these resources for the future.

Because the trade in wild animals and plants crosses borders between countries, the effort to regulate it requires international cooperation to safeguard certain species from over-exploitation. CITES was

EIA for Wamba Mega Dam Project | BY ENG. B.I. KASABULI -11<sup>th</sup> October 2018



conceived in the spirit of such cooperation. Today, it accords varying degrees of protection to more than 35,000 species of animals and plants, whether they are traded as live specimens, fur coats or dried herbs.

CITES was drafted as a result of a resolution adopted in 1963 at a meeting of members of IUCN (The World Conservation Union). The text of the Convention was finally agreed at a meeting of representatives of 80 countries in Washington, D.C., the United States of America, on 3 March 1973, and on 1 July 1975 CITES entered in force. The original of the Convention was deposited with the Depository Government in the Chinese, English, French, Russian and Spanish languages, each version being equally authentic.

CITES is an international agreement to which States (countries) adhere voluntarily. States that have agreed to be bound by the Convention ('joined' CITES) are known as Parties. Although CITES is legally binding on the Parties – in other words they have to implement the Convention – it does not take the place of national laws. Rather it provides a framework to be respected by each Party, which has to adopt its own domestic legislation to ensure that CITES is implemented at the national level.

For many years CITES has been among the conservation agreements with the largest membership, with now 181 Parties.

### **2.5.5. Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention or CMS)**

The Convention on the Conservation of Migratory Species of Wild Animals - more commonly abbreviated to just the Convention on Migratory Species (CMS) or the Bonn Convention-aims to conserve terrestrial, marine and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. Since the Convention's entry into force, its membership has grown steadily to include over 100 Parties from Africa, Central and South America, Asia, Europe and Oceania. The Convention was signed in 1979 in Bad Godesberg, a suburb of Bonn (hence the name), and entered into force in 1983. The depositary is the government of the Federal Republic of Germany. The CMS is the only global and UN-based intergovernmental organization established exclusively for the conservation and management of terrestrial, aquatic and avian migratory species throughout their range. CMS and its daughter agreements determine policy and provide further guidance on specific issues through their Strategic Plans, Action Plans, resolutions, decisions and guidelines. All maintain on their websites a list of all decisions taken, guidelines issues and Action Plans adopted by the Member States.

Fundamental Principles of the Convention are set out in Article 2. The Parties acknowledge the importance of migratory species being conserved and of Range States agreeing to take action to this end "whenever possible and appropriate", "paying special attention to migratory species the conservation status of which is unfavourable and taking individually or in cooperation appropriate and necessary steps to conserve such species and their habitat." Further in Article 2(2) The Parties "acknowledge" [but do not commit in stronger language, cf Art 2(3) "shall"] "the need to take action to avoid any migratory species becoming endangered".

In Article 2(3) the Convention states that "the Parties: (a) should promote, cooperate in and support research relating to migratory species; (b) shall endeavour to provide immediate protection for migratory species included in Appendix I; and (c) shall endeavour to conclude AGREEMENTS covering the conservation and management of migratory species included in Appendix II."

The Parties acknowledge the importance of conserving migratory species and agree that Range States – those countries through which migratory species pass or spend part of their lives - should take joint action. At August 2015, there were 121 Parties to the Convention.

The CMS Family covers a great diversity of migratory species. The Appendices of CMS include many mammals, including land mammals, marine and bats; birds; fish; reptiles and one insect. Among the instruments, AEWA covers 255 species of birds that are ecologically dependent on wetlands for at least part of their annual cycle. EUROBATS covers 52 species of bat, the Sharks MOU seven species of shark, the IOSEA Marine Turtle MOU six species of marine turtle and the Raptors MoU 76 species of birds of prey.

Migratory species threatened with extinction are listed on Appendix I of the Convention, with relevant provisions outlined in Article III, paragraphs 4 and 5. Parties that are Range States to Appendix I species are obliged to afford them strict protection. CMS Parties strive towards strictly protecting these animals, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Besides establishing obligations for each State joining the Convention, CMS promotes concerted action among the Range States of many of these species.

Migratory species that need or would significantly benefit from international co-operation are listed in Appendix II of the Convention. These species, either individually or by taxonomic group, are the basis for establishing instruments – regional or global – under CMS. For this reason, the Convention encourages the Range States to conclude global or regional Agreements.

In this respect, CMS acts as a framework Convention. The Agreements may range from legally binding treaties (called Agreements) to less formal instruments, such as Memoranda of Understanding, and can be adapted to the requirements of particular regions. The development of models tailored according to the conservation needs throughout the migratory range is a unique capacity to CMS. Several Agreements have been concluded to date under the auspices of CMS. They aim to conserve:

- Populations of European Bats (EUROBATS),
- Cetaceans of the Mediterranean Sea, Black Sea and Contiguous Atlantic Area (ACCOBAMS),
- Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS),
- Seals in the Wadden Sea (Wadden Sea Agreement),
- African-Eurasian Migratory Waterbirds (AEWA),
- Albatrosses and Petrels (ACAP),
- Gorillas and Their Habitats (Gorilla Agreement).

In addition, several Memoranda of Understanding (MoU) have been concluded to date under the auspices of CMS. They aim to conserve and the list include:

- High Andean Flamingos MoU,
- Aquatic Warbler MoU,
- Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia (Raptors MoU),
- Bukhara Deer MoU,
- Dugong MoU,
- South Andean Huemul MoU,
- Marine Turtles of the Indian Ocean and South-East Asia (IOSEA),
- Mediterranean Monk Seal MoU,
- Middle-European Population of the Great Bustard MoU,
- Pacific Islands Cetaceans MoU,
- Ruddy-headed Goose MoU
- Saiga Antelope MoU,
- Migratory Sharks MoU,
- Siberian Crane MoU,

- Slender-billed Curlew MoU,
- Grassland Birds MoU,
- Western African Aquatic Mammals MoU (Small Cetaceans and Manatees),
- West-African Populations of the African Elephant, and
- Marine Turtles of the Atlantic Coast of Africa MoU.

### **2.5.6. Lusaka Agreement on Cooperative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora (Lusaka Agreement)**

The Lusaka Agreement on Co-operative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora was the brain-child of Wildlife Law Enforcement Officers from eight Eastern and Southern African countries meeting in Lusaka, Zambia in December 1992, under the auspices of Zambia's Ministry of Tourism.

This was followed up with working group meetings involving CITES, Interpol and US Fish & Wildlife Service special agents, as well as London University lawyers of the Foundation for International Environment Law Development (FIELD). The development of this African initiative a year later led to formal inter-governmental negotiations under the auspices of the United Nations Environment Programme (UNEP). This led to the adoption of the Lusaka Agreement on Co-operative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora on 8th September 1994 in Lusaka, Zambia. Agreement is deposited with the Secretary General of the United Nations, New York and categorized as a UN Treaty (Environment) no. XXVII.11. Co-operative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora on 8th September 1994, with UN Secretary General, New York the Depository.

The Agreement came into force on 10th December 1996 with the ratification, or formal acceptance, by four signatories. Currently, there are Seven Parties to the Agreement: The Republics of Congo (Brazzaville), Kenya, Liberia, Tanzania, Uganda, Zambia and the Kingdom of Lesotho. Republics of South Africa, Ethiopia and the Kingdom of Swaziland are signatories.

The Agreement provides for setting up of a permanent Task Force that would implement its objectives. Consequently, the Lusaka Agreement Task Force (Task Force) was launched on 1st June 1999, with its headquarters located in Nairobi, Kenya. The Lusaka Agreement establishes a three-tier institutional mechanism depicted in figure 3-1 below. The three-tier institutional mechanism are as follows;

### **2.5.7. United Nations Convention to Combat Desertification in those countries experiencing serious Drought and/or Desertification, particularly in Africa**

By resolution 49/239 of 23 December 1994, the General Assembly welcomed the adoption of the United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, by the Intergovernmental Negotiating Committee, and welcomed also the signing of the Convention in Paris on 14 and 15 October 1994 by a large number of States and one regional economic integration organization. The Convention entered into force on 26 December 1996, in accordance with its article 36, paragraph 1.

Desertification was identified as one of the greatest challenges to sustainable development during the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992, and a request was made for the General Assembly to establish an "Intergovernmental Negotiating Committee for the elaboration of an international convention to combat desertification in those countries experiencing serious drought and/or desertification, particularly in Africa". The Intergovernmental Negotiating Committee was established by the General Assembly by resolution 47/188 of 22 December 1992. The Intergovernmental Negotiating Committee held five sessions in 1994 and the final draft text of the United

Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, was adopted on 17 June 1994.

The Convention contains forty articles, divided into six parts: Part I (introduction); Part II (general provisions); Part III (action programmes, scientific and technical cooperation and supporting measures); Part IV (institutions); Part V (procedures); and Part VI (final provisions). There are five regional implementation annexes to the Convention regarding Africa; Asia; Latin America and the Caribbean; the Northern Mediterranean; and Central and Eastern Europe.

The Convention opens an important new phase in the battle against desertification, but it is just a beginning. In particular, governments are regularly reviewing the action programmes. They also focus on awareness raising, education and training, in both developing and developed countries.

Desertification can be reversed only if far reaching changes are made in local and international behavior. Step by step, these changes will ultimately lead to sustainable land use and food security for a growing world population. Combating desertification, then, is really just part of a much broader objective: the sustainable development of countries affected by drought and desertification.

### **2.5.8. Convention concerning the Protection of the World Cultural and Natural Heritage**

The World Heritage Convention, whose full title is "The Convention Concerning the Protection of the World Cultural and Natural Heritage," was adopted by UNESCO in 1972. The Convention today has 131 countries that are party to it. Through this instrument nations of the world have agreed to inventory, recognize and protect unique and irreplaceable properties of universal value. For the first time, the Convention provides a permanent framework -- administrative and financial --for international cooperation in safeguard for mankind's cultural and natural heritage, and introduces the specific notion of a "world heritage" whose importance transcends to political and geographic boundaries.

The Convention is the bedrock document of World Heritage Sites, and so this first chapter is devoted to an examination of it and how it works.

The site administrator may not have a role in the process of nominating a site to the World Heritage List. Nevertheless, it is important that the site manager have a basic knowledge of the legal relationship of national, state (provincial) and local governments to the World Heritage Convention. These legal relationships to a large extent govern how a particular level of government can influence or control tourism at World Heritage sites.

#### **The World Heritage Lists**

On signing the Convention, each country pledges to conserve the cultural and natural sites within its borders that are recognized by the Convention as being of exceptional and universal value. In return, the international community helps to protect these treasures. To define these significant sites the Convention has established the World Heritage List. The cultural and natural properties proposed to the list must meet specific criteria defined by the World Heritage Committee. The first eight sites were inscribed on the list in 1978. Currently there are 358 sites listed in 82 countries: 260 cultural sites, 84 natural sites and 14 mixed cultural and natural sites.

The World Heritage Committee also prepares and publishes a List of Heritage in Danger. It includes World Heritage properties threatened; destruction, major alteration or abandonment. These threats may be caused by any one or combination of dangers including: accelerated deterioration, large-scale public or

private projects, rapid urban and tourist development, changes in use or ownership, armed conflict, fires, earthquakes, landslides, volcanic eruptions) floods, tidal waves and changes in water levels. Each time the committee makes a new entry on the List of World Heritage in Danger, it is required to publicize the fact immediately.

National and International Protection Member countries recognize that it is primarily their own responsibility to safeguard World Heritage properties in their countries. They agree to do all they can with their own resources and with international assistance. This includes agreement to:

- Adopt a general policy giving cultural and natural heritage a function in the life of the community and to integrate the protection of that heritage into comprehensive planning program,
- Set up services for the protection, conservation and interpretation of that heritage,
- Develop research studies and operating methods of counteracting dangers that threaten that heritage,
- Take appropriate legal, scientific technical, administrative and financial measures to preserve and present that heritage,
- Foster national or regional centers for training and research in the fields of conservation and interpretation.

It is the duty of the international community as a whole to cooperate in protecting world heritage; therefore member countries agree to help when other countries ask for assistance in identifying, protecting and conserving their sites of outstanding universal value. Also each country agrees not to take deliberate measures that might directly or indirectly damage World Heritage properties in another country.

### **2.5.9. United Nations Framework Convention on Climate Change**

The UNFCCC entered into force on 21 March 1994. Today, it has near-universal membership. The 195 countries that have ratified the Convention are called Parties to the Convention. The UNFCCC is a "Rio Convention", one of three adopted at the "Rio Earth Summit" in 1992. Its sister Rio Conventions are the UN Convention on Biological Diversity and the Convention to Combat Desertification. The three are intrinsically linked. It is in this context that the Joint Liaison Group was set up to boost cooperation among the three Conventions, with the ultimate aim of developing synergies in their activities on issues of mutual concern. It now also incorporates the Ramsar Convention on Wetlands.

Preventing "dangerous" human interference with the climate system is the ultimate aim of the UNFCCC.

The Convention recognized that there was a problem. This was remarkable for its time. Remember, in 1994, when the UNFCCC took effect, there was less scientific evidence than there is now. The UNFCCC borrowed a very important line from one of the most successful multilateral environmental treaties in history (the Montreal Protocol, in 1987): it bound member states to act in the interests of human safety even in the face of scientific uncertainty.

The ultimate objective of the Convention is to stabilize greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system." It states that "such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner."

The idea is that, as they are the source of most past and current greenhouse gas emissions, industrialized countries are expected to do the most to cut emissions on home ground. They are called Annex I countries and belong to the Organization for Economic Cooperation and Development (OECD). They include 12 countries with "economies in transition" from Central and Eastern Europe. Annex I countries were expected

by the year 2000 to reduce emissions to 1990 levels. Many of them have taken strong action to do so, and some have already succeeded.

Industrialized nations agree under the Convention to support climate change activities in developing countries by providing financial support for action on climate change-- above and beyond any financial assistance they already provide to these countries. A system of grants and loans has been set up through the Convention and is managed by the Global Environment Facility. Industrialized countries also agree to share technology with less-advanced nations.

## 3. DESCRIPTION OF BASELINE CONDITIONS

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### 3.1. General

To understand the underlying factors that can influence environmental and social degradation associated with the small dam development, it is critical to review the geographic, climatic, social, cultural and economic setting of the communities within the project area. The baseline environment of the project area consists of the natural, built and socio-economic factors. All these are interacting within a rule-governed environment and the levels and relationships of the impacts of the interactions represent the environmental management challenges.

### 3.2. General Description of the Project Area

#### 3.2.1. Geographical location

The project area is located in Samburu East Sub-County, Samburu East Sub-County in Kenya. It is located in Samburu National Reserve. Wamba town is the nearest market center and is the headquarters of the Wamba administrative division and the proposed supply area.

Wamba is a small town in Samburu County in central Kenya. It is located south-southwest edge of the Mathews Range, and northwest of the Samburu National Reserve. The northbound Isiolo - Moyale road (A2 road) is about 40 kilometres drives east of Wamba.

Wamba town is the headquarters of the Wamba administrative division, which is divided into five locations, Wamba being one of them. The location has a population of 4,051 (1999 census).

Wamba forms an electoral ward of the Samburu East Constituency and Samburu County Council.

The Sere Rongai (Wamba Mega) dam is to be constructed near Wamba town which is the headquarters of the Wamba administrative division, about 7km upstream of Wamba Town.

#### 3.2.2. Size of Catchment

The area demarcated as the catchment is approximately 14.601km<sup>2</sup>. The catchment rises from an altitude of 2260 masl to 1090 masl as by the survey of Kenya. The average catchment slope was found to be 24%. This slope has been used in the determination of flood from the catchment.

#### 3.2.3. Topography

The topography of the area is highly varied, reflecting closely the details of the underlying geology. Physiographic features fall into three categories:

- i. The Basement ranges
- ii. The volcanic highlands
- iii. The lowlands of Ewaso Nyiro Basin.

##### 3.2.3.1. The Basement Ranges

The northern ranges in the Wamba area include the highest point (Warges, 2690m) and the spectacular mass of Ol Doinyo Sabachi (Lolokwi). These ranges are breached to the south by the Ewaso Nyiro River where it flows into the Samburu National Park. Further south, the Kotim-Ol Doinyo Dengishu ranges continue to the west of Isiolo Township, and to the south-west the Mukogodo-Loldaika ranges from a belt of high forested country with a distinct NNW grain drained by the headwaters of the Kipsing River.

The massive quartzofeldspathic Kotim gneisses tend to particularly to give rise impressive inselbergs complexes for example Shaba (1611m) and Kamanga (1465m) massifs to the north in the Losesia area.

Thick spreads of colluviums in these mountains and the existence of tors on many of the highest summits suggest extensive stripping of surface material in the Loldaika range.

#### **3.2.3.2. The Volcanic Highlands**

The southern fringe of the area corresponds in part with the southern slopes of the denuded composite volcanic cone of Mt Kenya, where the ground rises to about 3520m (Mbaru area) separated by the Meru saddle at about 1400m from Nyambeni Hills in the south-east.

#### **3.2.3.3. The Lowlands**

The extensive poorly developed plain-land, associated particularly with the basin of the Ewaso Nyiro River corresponds broadly to End-Tertiary erosion bevel studded with inselbergs and tors and partly flooded by Tertiary lavas. It is further marred by Quaternary dissection but is identifiable in Longopito-Kipsing areas. It is a broad plain lying at about 1000m with leveled extensive tracts of diverse metamorphic rocks particularly the less resistant bitotie gneisses. Lava flows from Mt Kenya and Nyambene volcanic shields has enhanced the planar aspect of the southern flanks of Ewaso Nyiro valley. The lava flow has also created inliers of metamorphic hills, tors and inselbergs to the south of the area.

The project area is located on Mathews Ranges and lies at an altitude of 1472m a.m.s.l.

#### **3.2.4. Climate**

Samburu is one of the driest counties in Kenya with temperatures ranging between 25°C during the coldest months (June and July) and 35°C during the hottest months (January to March). The county receives between 200mm and 250mm of rainfall annually. The rainfall pattern is unpredictable and at times the county receives no rain in a whole year.

#### **3.2.5. Rainfall**

Rainfall in the County follows a fairly erratic pattern varying significantly both in temporal and spatial scale. The County experiences both short and long rains. The driest months are January and February. The long rainy season falls in the months of March, April and May. A part from Wamba areas, short rains occur during the months of July and August, sometimes extending into September. At Wamba areas, the short rainy season is usually delayed and occurs in October and November and sometimes extends into December. This short rainy season succeeds a fairly dry spell during the month of June. Rain distribution varies across the county. The Matthews range, however, receive the highest amount of rainfall between 750 mm and 1250 mm per annum. The central basin and the plains east of the Matthews Range are the driest parts of the county with annual rainfall of between 250 mm and 500mm.

#### **3.2.6. Geology**

The dam is located along a narrow section of the Sere-Rongai River valley. The cross section along the designed axis shows an as-symmetrical U-profile.

The area of the proposed dam is dominated by high grade metamorphic rocks. The rocks are exposed along the river channel and on both banks. In the reservoir area where soil cover is thin, numerous exposures are also seen. These are classified under Kotim gneisses and comprise mainly of massive leucocratic quartzo-felspathic metapsammities derived from arenaceous original sediments



in a supercrustal sedimentary basin. The dam axis area along the river cut is dominated by massive quartzo-feldspathic gneiss.

The strike of the rocks are generally north-south thus the Sere Rongai stream channel cuts almost parallel to the strike of the rocks. The rock formation is generally massive and exhibits minimal jointing where exposed.

From the geological map of the project area and observations made on the ground:-

- A major fault occurs upstream of the dam axis marked A-A' on the map in figure-4-2 and is orientated approximately NE-SW. A major stream flowing from the east that will feed into the dam is structurally controlled by this fault line.
- A second major fault occurs downstream of the dam axis and is marked B-B' with same orientation as A-A'.
- The Sere-Rongai stream seems to follow a geosynclinal low whose minimal has bands of muscovite gneiss in massive quartz-feldspar gneiss host rock.
- The dam axis is juxtaposed between the two faults discussed above hence they have no impact on the storage. The fault-line upstream of the dam is beyond the highest water-line in the reservoir hence has no significance with regard to seepage losses.

During the geophysical and geological survey, particular attention was paid to isolate any other zones of weakness unidentified at the scale of regional geological, mapping and subsequently make the necessary recommendations on the appropriate mitigation measures.

Rocks exposed over the reservoir and at the dam axis are massive in nature and show little or insignificant jointing. In the river valley proper, slump blocks have accumulated and have been subsequently covered with alluvial deposits. Notably, rock-falls and slumping has left spectacular cliffs on right bank as shown in figure-4-2.

Joints may allow seepage losses from the dam and hence require to be sealed if identified.



*Figure 3-1: Massive quartz-feldspar gneiss cliff on the left bank*

### **3.2.7. Vegetation**

The predominant trees are acacia.

### **3.2.8. Wildlife**

Generally, the area is endowed with a wide variety of wildlife species. The big game found in the area includes elephants, cheetahs and leopards, and the occasional elephant and lion. Other species are zebras, antelopes, hyenas, warthogs and jackals. Ostriches and a wide variety of other bird species are also common.

### **3.2.9. Water Resources**

Samburu County is classified as water deficit area. In terms of drainage basin, the county falls under Ewaso Nyiro North Catchment area (ENNCA) in the sense that all its water sources drains into Waso Nyiro river basin. Apart from the aforementioned river there exists other perennial river, but the bulky of the county is criss-crossed by many seasonal rivers (laggas).

Mathew ranges is the main catchment area within Samburu East sub county though unsubstantial perennial spring water sources exists.

General the county has poor ground water and surface water coverage.

### **3.2.10. Surface water**

The existing spring water from Mathews Ranges is inadequate. The supply is being rationed twice weekly. The current production is estimated at 168m<sup>3</sup>/day against the water demand of 1004m<sup>3</sup>/day implying that the water coverage is estimated at 16.7% (168/1004).

Arising from the foregoing and in order to spur economic growth, Wamba Town Water Supply has to be augmented to at least satisfy the current water demand.

### **3.2.11. Groundwater**

The county has been classified as water deficit area. The main sources include water pans, dams and shallow wells. The average distance to the nearest watering point for is approximately five kilometres in rural areas but it becomes much shorter in most urban and market centres to about 0.5 km.

### **3.2.12. Sanitation**

Sanitation in the county is poor due to low latrine coverage as most people do not use pit latrines due to cultural beliefs. The public health department in collaboration with stakeholders undertakes chlorination of water sources through provision of chlorination tablets across the county. The water department also undertakes health education on sanitation, water treatment and safe storage before consumption. The county's sanitation figures include flush toilet-1 percent, uncovered pit latrine- 20 percent and covered pit latrine- 12 percent.

### **3.2.13. Land Ownership**

Most of the land in Samburu is owned communally or by group ranches. These systems do not guarantee individual rights. Absence of clear land rights is a major disincentive for communities to embrace best land use practices. This situation has contributed greatly to the unsustainable land use

practises in the county. In addition, lack of title deeds is a constraining factor in the promotion of small scale agriculture since farmers are unable to access credit facilities due to lack of collateral.

### **3.3. Existing Human Environment**

#### **3.3.1. Population**

##### **3.3.1.1. Human Population**

According to the 2009 Kenya Population and Housing Census, Samburu East Sub-County had a population of 59,094 people. This is projected to grow to 67,533, 77,180 and 84,363 people by 2012, 2015 and 2017 respectively. Wamba Town is the District Headquarter of Samburu East District which was caved out of Samburu in year 2007. The departmental heads have been posted to the district and there is mushrooming of commercial activities which befall a district headquarter like Wamba Town.

##### **3.3.1.2. Livestock population**

There is a no proper livestock population data recorded in Wamba.

### **3.4. Social and cultural settings**

The area where Wamba Dam is located is inhabited by the Samburu ethnic group who largely practice Christianity, Islam or traditional African beliefs. Those who profess Islam or traditional religion are normally polygamists. Most of the population does not practice family planning. As a result of this, population growth is fairly high.

The Samburu comprise 75% of the population, the Turkana 20% and the other tribes 5%. Agriculture is practised by only a small portion of the population. Pastoralism is the main livelihood for the resident communities who rear cattle, sheep, goats, donkeys and camels. Communities constantly fight over livestock, pasture, water and land. Cattle raids on neighbouring communities are a culturally-accepted practise amongst the tribes residing in this area and have led to much suffering and impoverishment.

The Samburu dominate the politics of the sub-county; conflict in the area cannot be divorced completely from politics and land ownership.

### **3.5. Economic activities**

The major economic activity is livestock keeping practiced by the majority of the people in the rural areas. The animals move freely to wherever there is pasture. There has been little growth in the area over the last few decades due to deadly and never ending conflicts among the pastoralists, and armed attacks on travellers and residents.

#### **3.5.1. Crop farming**

Crop production is very limited due to erratic rainfall and the local community's apathy to farming. Despite the harsh climatic conditions, some Samburu residents have recently started growing crops in effort to fight starvation. Drought-resistant crops such as millet, sorghum and certain species of maize are grown in areas such as Lpartuk, Poros and Malaso.

### **3.5.2. Livestock husbandry, veterinary services, bee keeping and fishery**

Approximately 75% of the land is classified as range land and nomadic pastoralism is the most common activity over a large part of the area. Camels, cattle, goats, sheep are the most common livestock reared mainly for milk and for commercial purposes. Donkeys play an important role in providing transport; they are used for ferrying water from the river, for daily chores, and for ferrying household items when migrating from one region to another. Some poultry farming is practised for egg production and for meat especially for children. Veterinary and agricultural extension services collapsed some decades ago but the County Government has plans to revive them.

### **3.5.3. Soil**

The catchment for the proposed dam can be classified as partly cultivated or covered with vegetation to Sandy bare soil and a run off factor of 0.35 is assumed.

### **3.5.4. Tourism**

Tourism in the area has been adversely by the never-ending conflicts in the area however some of the residents have been employed in the county's safari lodges in the Samburu National Reserve Park and others working as tourist guides. The county's main attraction sites offer a thriving market for Samburu artifacts such as beads, necklaces and bracelets.

The County is endowed with a variety of natural sceneries like the plateaus, escarpments, valleys and wildlife which could be tapped to promote tourism in the county. Currently, Samburu National Reserve hosts various lodges and game sites which are mainly in Samburu East and is the greatest revenue earning to Samburu County. The locals also have indigenous knowledge and cultural artefacts that could be tapped to promote cultural tourism. The annual camel derby tourist promotion event in the county has been attracting both local and foreign tourists leading income generation in the county.

### **3.5.5. Banking and Financial Services**

There is no bank in Wamba town.

### **3.5.6. Commerce and Industry**

There are no industries in the area.

### **3.5.7. Housing**

Wamba town is an area where there are decent housing with several government quarters which house civil servants although inadequate. Some are well maintained through grants received by the Ministry of Housing and others need refurbishment. However, individual settlements are poorly planned and informal settlements are emerging in the town centre.

Apart from urban centres where there are permanent houses, the rest of the county is dotted with Manyattas.

## **3.6. Socio-Economic Status**

### **3.6.1. Employment**

Wage earning population is estimated to be 3,700 or a paltry 1.5 percent of the County population. These are mainly teachers, Civil Servants, and NGO employees. In the hotel sector the average

number of employees is 4,320 and they are mostly concentrated in Samburu East. There is need for the establishment of more industries to provide more employment opportunities within the county.

### **3.6.2. Poverty Index**

Samburu is classified as one of the poorest counties with a poverty rate of 73.5%, which is higher than the national poverty rate of 45.9%.

### **3.6.3. Ability to pay for water**

Approximately 3% of the household income is used to pay for water services, about 91% of the population can afford to pay Kshs 270 per month.

### **3.6.4. Willingness to pay for Water Services**

The willingness to pay for water services is rated as high considering deficit of water resources.

## **3.7. Education**

Samburu East Constituency has 3 schools in total comprising of zero (0) primary schools and three (3) secondary schools

## **3.8. Transport and infrastructure**

The County has a total road length of 1,449 kilometres most of which are rural access roads whose management falls under the Kenya Rural Roads Authority. Good road network will enable the vast resources of the county to be exploited for the benefit of resident communities and the nation at large. The County is expecting a total of 60 km of road network under tarmac planned as part of Lamu Port–Southern Sudan–Ethiopia Transport (LAPSSET) Corridor project. LAPSSET is a flagship project under Vision 2030. Once implemented, the road will unlock the development potential of Samburu County. The link to Juba under this project is also expected to cut across the county covering a significant section thereby enhancing connectivity within the county and also between the county and the neighbouring counties.

Wamba is northbound on the Isiolo - Moyale road (A2 road) and it is about 40 kilometres drive east of Wamba.

## **3.9. Posts and Communications**

There is a postal office in Wamba. The mobile phone network coverage within the county is estimated to be 3 percent but concentrated in urban centres. The major mobile providers in the county include Safaricom, Orange Telkom and airtel. Usage of landline telephone services has been on the decline in the past few years following the entrance of the mobile phone service providers in the Kenyan market.

## **3.10. Health**

There is Wamba Hospital is located in Wamba town. Wamba Hospital, also known as Wamba Catholic Hospital, is a hospital in Wamba, Samburu County, Kenya. Wamba Hospital It was established in the 1960s. Money is donated to Wamba Hospital by Aiglon College, a school located in Switzerland, via the S.H.E.P. Foundation. This foundation has recently helped build a school building for the children who are taken care of at the hospital.

### **3.11. Administration**

Administratively the site is located in Wamba Division, Samburu East Sub-County, Samburu County.

## 4. DESCRIPTION OF PROPOSED DEVELOPMENT

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### 4.1. Introduction

Wamba Mega Dam is a proposed 15m high zoned rock fill dam of capacity 257,335.25m<sup>3</sup> and which will submerge 6.17 hectares of Samburu National Reserve.

The proposed dam will take about 3 months to get filled with water every year.

The project area is located in Samburu East Sub-County, Samburu East Sub-County in Kenya. It is located in Samburu National Reserve. Wamba town is the nearest market center and is the headquarters of the Wamba administrative division and the proposed supply area

The Sere Rongai (Wamba Mega) dam is to be constructed near Wamba town which is the headquarters of the Wamba administrative division, about 7km upstream of Wamba Town.

The development of the dam will involve:

- Construction of a 15m high cofferdam.

### 4.2. Proposed Developments

#### 4.2.1. Sources of Water

The current water source for Wamba town is from an existing Mathews Ranges spring water which is inadequate. The supply is being rationed twice weekly. The current production is estimated at 168m<sup>3</sup>/day against the water demand of 1004m<sup>3</sup>/day implying that the water coverage is estimated at 16.7% (168/1004).

Arising from the foregoing and in order to spur economic growth, Wamba Town Water Supply has to be augmented to at least satisfy the current water demand.

The Total Water Demand of Wamba Town is estimated at 1,730m<sup>3</sup>/day by the year 2036. The Ministry of Water and Irrigation Guidelines for the Design, Construction and Rehabilitation of Small Dams and Pans in Kenya dated June, 1992, table 2.1 indicates the dry spell to be assumed to be 9 months. However, due to climate change, it is recommended that the dry period be assumed to be 11months.

Hence the storage required to provide 1,730m<sup>3</sup>/day by year 2036 is 742,170m<sup>3</sup> by assuming a dead storage of 30% against 257,335.25m<sup>3</sup>.

During dry spell the conflict between wildlife and human escalates since the Mathew ranges spring dry forcing wildlife to look for water in homestead.

Arising from above, construction of this dam will minimize human-wildlife conflict due to provision of water to wildlife from the dam.

#### 4.2.2. Strategy

The proposed project is meant to serve the people of Wamba Town as well as during dry spell the conflict between wildlife and human escalates since the Mathew ranges spring dry forcing wildlife to look for water in homestead.

Arising from above, construction of this dam will minimize human-wildlife conflict due to provision of water to wildlife from the dam

According to the design, the proposed development is for the construction of a dam whose characteristics are as follows:

<b>A1. LOCATION</b>		
<b>County</b>	Samburu	
<b>Sub-County</b>	Samburu East	
<b>Source</b>	Sere Rongai-Sere Fereji Stream	
<b>Drainage Basin</b>	EwasoNg'iro North	
<b>Purpose</b>	Domestic Water Supply for Wamba Town and Environs	
<b>Survey of Kenya Map SK</b>	93/2-Wamba(1:50,000)	
<b>COORDINATES</b>	UTM	DEGREES
	Region	37N
	Longitude	315456E E037.341
	Latitude	106671N N00.96466
	Altitude	1362M
<b>A2. CATCHMENT</b>		
<b>Area</b>	14.60 km <sup>2</sup>	
<b>Average slope</b>	24%	
<b>Maximum probable flood (PMF)</b>	328.13m <sup>3</sup> /s	
<b>A3. RESERVOIR</b>		
<b>Design Capacity</b>	257,335.25m <sup>3</sup>	
<b>Submerged area at NWL</b>	6.171Hactares	
<b>A4. EMBANKMENT</b>		
<b>Type</b>	Zoned Rock-fill Embankment	
<b>Height</b>	15m	
<b>Crest Length</b>	203.844 m	
<b>Crest Width</b>	8.0m	
<b>Upstream Slope</b>	1:3.0	
<b>Downstream Slope</b>	1:2.5	
<b>Gross Freeboard</b>	3.0 m	
<b>Estimated Lifespan</b>	15 years	
<b>Estimated Investment Required</b>	208,491,484	

#### 4.2.3. Water Draw-off Facilities

A draw off system will be constructed consisting of an intake structure is constructed at the plug section of the diversion tunnel. As for intake type, the drop-inlet type is employed from economical point of view.

#### 4.2.4. Transmission and Distribution Works

Spillway and Desilting

The spillway is located on the left bank (facing upstream) of the embankment, and it is designed to cater for the 1 in 500 year return period flood flow. The spillway is an open overflow type spillway, with concrete lining. The control section is made of a concrete sill which acts as a weir is 40.0m wide by 4m high.

Outflow channel: the out flow channel consist of an outflow chute and a stilling basin. The outflow channel is 480m long, from sill (CH 0 + 080) to the end stilling basin (CH 080 + 240) and a channel back to the valley.



#### **4.2.5. Fencing**

The water project will be fenced but the enclosure will take cognizance wildlife's watering needs, their migratory patterns and consequent rights of way. The main aim of the fence is to prevent humans and livestock from direct entry into the reservoir and consequent water contamination.

Dam Management Committee

A management structure will be put in place to protect the dam, control the use of water resources, collect revenue and maintain the infrastructure.

#### **4.2.6. Characteristics of Wamba Dam**

*Wamba Mega Dam is a proposed 15m high zoned rock fill dam of capacity 257,335.25m<sup>3</sup> and which will submerge 6.17 hectares of Samburu National Reserve.*

The proposed dam will take about 3 months to get filled with water every year.

Below is the layout and elevation of the dam.

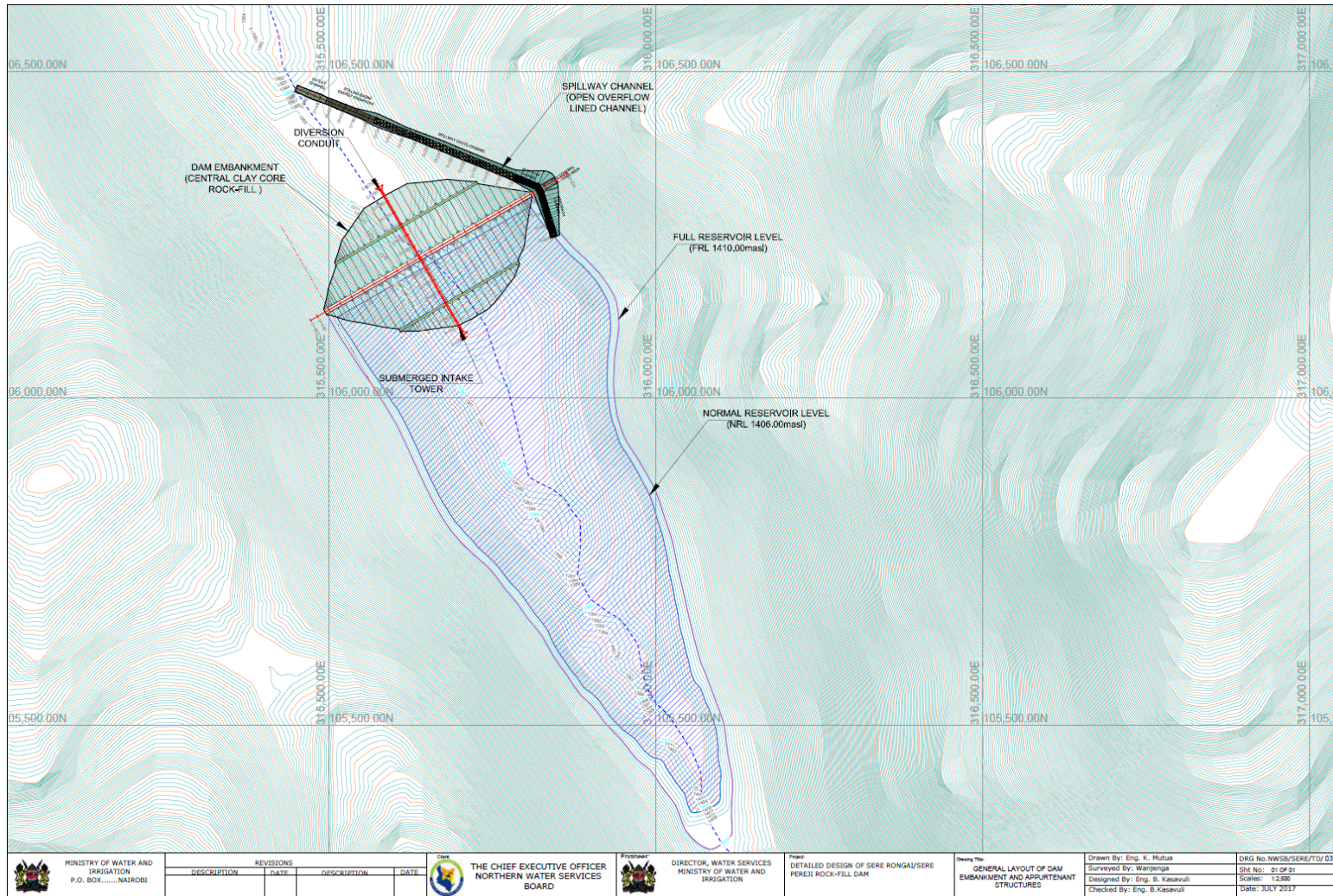
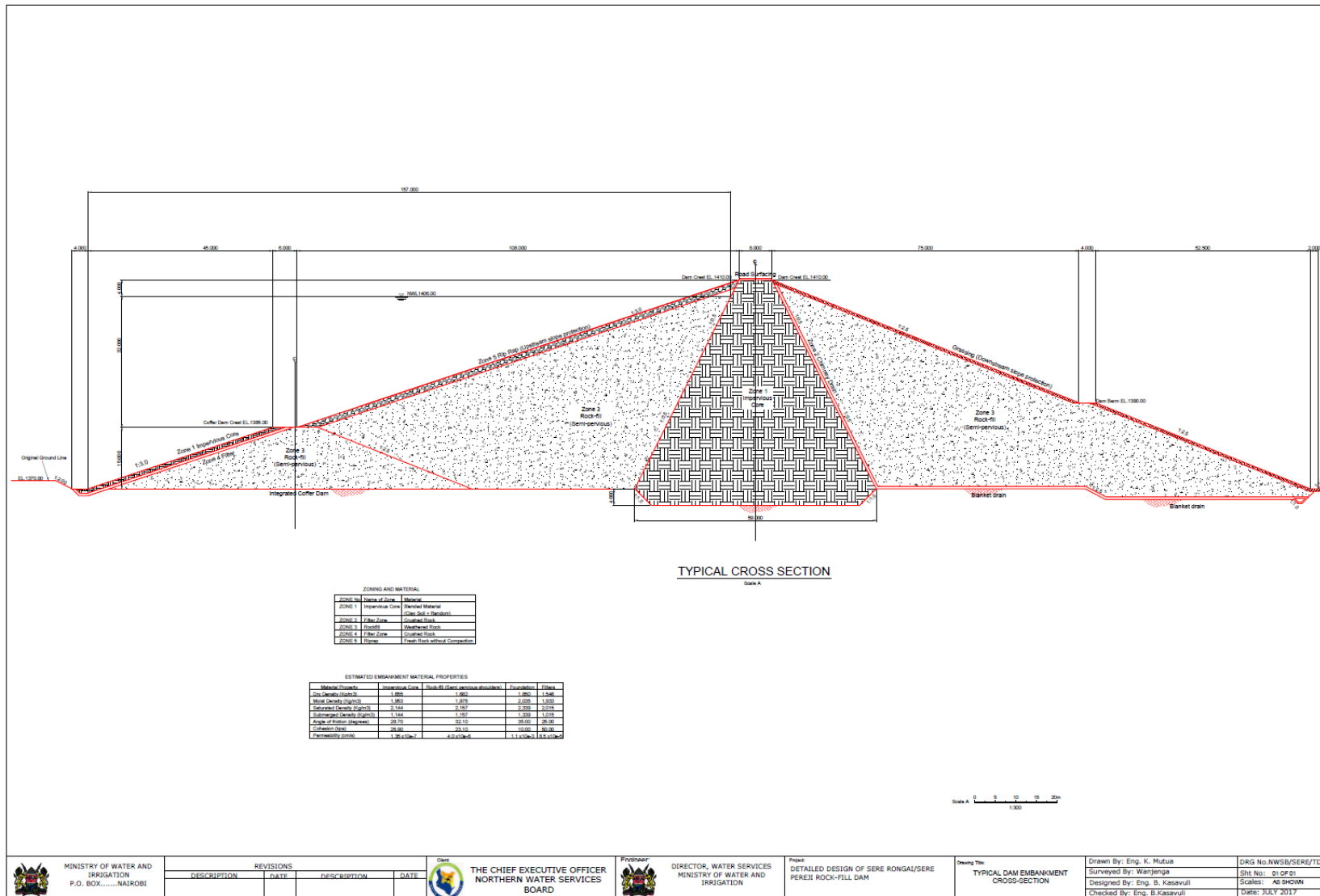


Figure 4-1: The layout plan of dam and ancillary works



*Figure 4-2: Typical Embankment Section*

#### 4.2.7. Project Budget

The Construction of Sere Rongai Zoned Rock fill Dam is estimated at Kshs 208,491,484.

Table 4-1 has the details.

*Table 4-1: SERE RONGAI ZONED ROCKFILL DAM*

SERE RONGAI ZONED ROCKFILL DAM		
SUMMARY PAGE		
BOQ No	Description	Amount
		Kshs
1	Preliminary and General Items	22,388,545
2	Dam Works	176,174,774
	Sub-Total	198,563,319
	Add 5% for Contingencies and Price Excalation	9,928,166
	<b>Grand Total</b>	<b>208,491,484</b>

## 5. DESCRIPTION OF THE ALTERNATIVES TO THE PROJECT

### 5.1. General

The sites for water sources, distribution, storage and sanitation have been evaluated based on their technical, social, cultural and economic viability. The proposed water development project resulted from numerous evaluations (including scoping studies, user preferences, optimization studies, basic engineering studies, and value engineering assessments) conducted to assess alternatives and to select the most viable, least risky, and environmentally, socially, culturally and economically acceptable project option. Several factors, either independently or in combination with others, were used to eliminate different alternatives for the project so as to remain with the most viable. These factors were: geographic location, topography, extent of physical and geological conditions, land ownership in the project area, environmental conditions or characteristics, stakeholder preferences. They are summarised in Table 5-1 below.

Table 5-1: Descriptions of alternatives considered and their advantages or disadvantages

Alternative Elements	Basis for Preference or Rejection
<b>1. Development of Water Sources</b>	
<b>Surface Water Sources (Stream)</b>	<b>Accepted:</b> Sere Rongai-Sere Fereji Stream will be a reliable source of water since the drainage basin is EwasoNg'iro North.
<b>Boreholes and Shallow Wells</b>	<b>Rejected:</b> groundwater potential in the area is poor and boreholes and shallow wells have little yield and cannot meet the existing water demand.
<b>Small Dams/Water pans</b>	<b>Rejected:</b> The results of the geological investigations was used to determine the weak points in the proposed Sere Rongai-Sere Fereji Concrete dam site which needed to be treated appropriately to avoid surface water loses through infiltration and percolation. Arising from this Geophysical Report, the site was moved near NIB site located about 3-4km downstream.
<b>High Earth Fill Dams</b>	<b>Accepted:</b> There is Sere Rongai-Sere Fereji Stream in the vicinity that could host such a structure.
<b>Sand Dams</b>	<b>Rejected:</b> These can only alleviate the problem but they cannot meet the water demand.

### 5.2. Project Siting Alternatives

The project site has been selected based on the location of the population to be served, water availability and amount, and the presence of an existing dam, accessibility, and the availability of clay soils for the dam wall and reservoir bed.

There was no alternative site for the project that was surveyed.

### 5.3. The “With Project” and “Without Project” Alternative

The “Without Project” alternative would imply that the water and sanitation status be left in its current state. This decision would not be acceptable because it would continue to adversely affect the health, livelihoods and economic growth in this marginalized region of the Kenyan republic. While the “no project construction’ alternative may ensure non-interference in the biodiversity, social conditions without the project area may continue to suffer as a result.

Without the project, the high population growth will result to increasing demand for water. Furthermore, the expected higher volumes of untreated human excreta may lead to contamination of water sources, and thereby compromise the quality of health in the area. The ecosystem, quality of life and the living standard of residents of the project area will be greatly damaged.

#### **5.4. Construction Techniques**

Infrastructure development techniques proposed for the construction of the dam, water points and sanitation facilities are based on best practice and are not likely to have significant negative effects on the environment. Various methods have been considered taking into account the ease of operation, reliability, sustainability, on-situ conditions and ability to meet the required standards.

The various construction techniques would involve use of heavy machinery or human labour or a combination of the two. A human labour approach on its own is likely to have limitations, such as the inability to excavate in rock, move large soil volumes, and slow progress. From a positive perspective however, human labour techniques are and are a boost for the local economy as it usually involves employment of locals. Heavy machinery, on the other hand, requires minimal human labour, is more expensive, has a higher work rate but is also less environmentally-friendly.

In respect to the scope and spatial coverage of the proposed works, it is recommended that a combination of both human labour and heavy machinery be employed for sustainable, cost-effective and speedy implementation of the project. The detailed engineering design of the water facilities construction works will eventually be implemented through tender award for the actual construction.

#### **5.5. Construction Materials**

Various types and quantities of materials will be used during the project construction period. The contractor should ensure that he uses locally available materials as much as possible, while ensuring that in so doing, he does not bring about environmental degradation and affect the quality of works.

## 6. IMPACT ASSESSMENT

### 6.1. Introduction

Construction and the subsequent operation and maintenance activities will comprise the actions given in Table 6-1 below and are likely to affect the atmosphere, water and soil, biodiversity, socio-economic environment, hydrology and geology of the area, and wildlife characteristics. The degree to which any component is affected depends on the location and size of the dam, reservoir and water points, and the construction methods. The consultant will ensure implementation of the project is done in a professional manner to avoid affecting the environment negatively.

Table 6-1: Project Activities and how they might affect Bio-physical and Human Environments

Project Activities	Likelihood of Affecting Environmental and Physical Parameters								
	Socio-Economic Environment					Bio-Physical Environment			
	Economy	Education	Employment	Tourism	Health	Water	Soil	Flora	Fauna
<b>Pre-construction Phase</b>									
Land acquisition	x	x	x	x	x	√	√	√	√
<b>Construction Phase</b>									
Site clearance	√	x	√	x	√	√	√	√	√
Trench excavation	√	x	√	x	√	√	√	√	√
Materials haulage	√	x	√	x	x	x	√	√	√
Construction camp	√	x	√	x	√	√	√	√	√
Construction works	√	x	√	x	√	√	√	√	√
<b>Post-Construction Phase (Operation and Maintenance)</b>									
Improved water and sanitation	√	√	√	√	√	√	√	√	√
<b>Project De-commission Phase</b>									

KEY

√ – Has effect

x – Has no effect

### 6.2. Typology of Impacts

Project activities are likely to result in social and environmental impacts. The impacts are defined as:-



**Positive Impact:** A change which improves the quality of the environment (for example by increasing species diversity, improving the reproductive capacity of an ecosystem, removing nuisances, or by improving amenities).

**Negative Impact:** A change which reduces the quality of the environment (for example, by reducing species diversity, by diminishing the reproductive capacity of an ecosystem, by damaging health or property, or by causing a nuisance).

The environmental impacts of development proposals can vary depending on the type, nature, magnitude, extent, timing, duration, certainty and reversibility of the impacts. In regard to significance, the impacts are regarded as reversible, irreversible, short term or long-term. The potential impacts of the project fall under two broad categories: bio-physical (natural) and socio-economic environments and are listed in Table 7.2. A matrix table will be used to analyse these impacts.

### **6.3. Potential Impacts in various phases**

#### **6.3.1. Preconstruction Phase Impacts**

These are both direct and indirect impacts which will include land take for the permanent structures. The long-term impact is that land once acquired for construction will not thereafter be available for other uses. The laying of water pipes should only temporarily affect land resources. For all the land requirements, adequate land has been identified for all the activities and works. Generally, there should be no compensation since most of the land is a Group Ranch owned by the community, who have agreed to unconditionally give up any land required for the project. Furthermore, this is an existing project and the area to be submerged is already known. However, construction of the pipeline and storage tanks may encroach on private land; in such cases, compensation will be made at current official rates but this is expected to be minimal. It is not expected that there will be any relocation.

It is therefore proposed that any land acquisition action is not reversible during the design life of the works. To prevent future land disputes, the KFS should formally declare their acquiescence to part of the land being acquired for the water project.

#### **6.3.2. Construction Phase Impacts**

Construction activities are expected to generate the following adverse impacts:

- i. Airborne dust will be caused by excavation, demolition, vehicle movement and materials handling, particularly downwind from the construction sites;
- ii. Air pollution will be caused by emissions from vehicles and construction machinery;
- iii. Noise pollution will be caused by construction equipment and vehicular movement, potentially affecting local communities and wildlife who may be nearby;
- iv. Wastes discharge from construction camps could create new pollution sources. The camps are sources of liquid and solid wastes from cooking and sanitation processes, and also waste oil from machinery maintenance;
- v. Excavated materials will generate large volumes of excess materials for disposal.

However, it is expected that construction activities will be short term and services as well as the landscape will be restored to their original status in a short while. The project is expected to provide skilled and unskilled labour for these activities, provide business opportunities for food vendors and other small service providers and provide opportunities for skills development and transfer.

It will be important for construction sites, access roads and materials-handling sites to be water-sprayed on dry and windy days, up to three times a day, especially if these sites are near sensitive receptors such as settlements. Vehicles and construction machinery should be properly maintained and compliant with relevant emission standards. Construction activities should be carefully scheduled so as to minimize the impact of noise from construction machinery. Night-time uses of certain noisy machines, such as pile drivers and concrete vibrators, will need to be regulated.

Temporary land occupation should be well planned ahead of construction to minimize the impact of the disturbance. Land should be reinstated to its original condition upon completion of works. Materials should be covered during transportation to avoid spillage or leakage. Materials should be stored in appropriate places and covered or sprayed to minimize dust. Construction wastes should be promptly removed from the site.

Construction should be immediately suspended if any item or product of archaeological, historical or cultural importance is discovered. The relevant authority, as well as the NWSB, should then be promptly notified, and only after thorough investigations are complete should construction be allowed to resume.

The contractor should undertake safety measures at the construction sites to protect the workers and the public, and warning signs should be provided to warn of potential safety hazards at and around the construction sites. The contractor and construction supervisors should produce evidence that they have participated in an environmental training program before.

### **6.3.3. Operation Phase Impacts**

Overall, there should be a significant positive impact in terms of air quality in relation to odour. Presently, a large part of the community in the project area practise open-air defecation. Site investigations and discussions with residents revealed that though the problem has not yet reached endemic proportions, these nuisance odours, as well as other health and hygiene concerns from these practices, are bound to increase. The ventilation-improved pit latrines to be constructed in the project area should substantially improve the quality of air, especially around the water points.

To achieve benefits, the following measures need to be undertaken:

- i. Following operational procedures properly and ensuring that sanitation facilities are cleaned regularly.
- ii. Development of contingency plans for overflows equipment malfunction and other conditions which may affect the proper functioning of the facilities.
- iii. Regular consultations with local communities and pastoralists should be held and prompt responses made regarding any concerns raised with regard to the operations of all aspects of the project.
- iv. Landscaping of the project site, including grassing, reforestation and afforestation.

It is expected that water abstraction from the impounded runoff will not adversely affect environmental, hydro-geological and ecological functions in the project area; but where this occurs without having been foreseen, immediate remedial measures will be instituted.

Due to expected and unexpected occurrences, it is the duty of the dam and water point operators to report them without undue delay. This implies that NWSB has to have strict operational rules to govern the proper usage of the dam. To this end, NWSB should ensure that the community is well-trained and a dam management committee formed to regulate use of the water and protect the catchment.

Overall, the water supply situation in the nearby settlements should show some improvement while short-term construction phase should be mitigated. Although improved water supply will lead to increased generation of waste water, the use of waste water management facilities such as cess-pools, Imhoff tanks or septic tanks will be incorporated at Lengusaka Market centre.

#### **6.3.4. Projects De-commissioning Phase Impacts**

De-commissioning is not anticipated in the case of this water project. On the contrary, regular rehabilitation, expansion and modification are anticipated to take place depending on increasing water demand.

Table 6-2: : Activities Involved, Expected Impacts and their Characteristics

No	Main Activities	Detailed Activities Involved	Expected Impacts	Typology	Duration	Reversibility
<b>Pre-Construction Phase</b>						
1.	Acquisition of Land and Borrow sites.	Demolition of existing unwanted structures (if any)	<ul style="list-style-type: none"> <li>Noise, vibrations and dust from demolition</li> <li>Destruction of social and culturally sensitive site e.g. graves</li> </ul>	(-1) (-1)	ST LT	√ x
2.	Machinery Mobilization and Labourers recruitment	<ul style="list-style-type: none"> <li>Transportation of heavy machinery to site.</li> <li>Recruitment of casual labourers.</li> </ul>	<ul style="list-style-type: none"> <li>Excessive dust, noise and vibration.</li> <li>Creation of job opportunities (Skilled/unskilled).</li> <li>Damage to the roads by vibration and heavy trucks.</li> <li>Chances of traffic accidents.</li> <li>Influx of migrants from surrounding areas in search of employment opportunities.</li> <li>More men than women will be employed in construction works.</li> <li>Temporary imbalance between men and women due to the arrival of male workers which can lead to increase in STD's.</li> </ul>	(-2) (+4) (-1) (-1) (-1) (-1) (-2)	ST ST ST ST ST ST	√ √ x √ √ √ √
3.	Pre-Construction Investigations	<ul style="list-style-type: none"> <li>Topographical survey for the dam</li> <li>Geotechnical and soils investigations</li> </ul>	<ul style="list-style-type: none"> <li>Clearance of survey area for space</li> <li>Creation of casual jobs during surveys</li> </ul>	(-2) (+1)	ST ST	√ √
<b>Construction Phase</b>						
4.	Construction of the small dam	<ul style="list-style-type: none"> <li>Site clearance.</li> <li>Excavation for foundations. Material movement.</li> <li>Installation of water draw-off pipes.</li> </ul>	<ul style="list-style-type: none"> <li>Soil erosion through wind and runoff.</li> <li>Mixing of soil layers during excavation and backfilling.</li> <li>Adverse environmental effects associated with transportation and disposal of large volumes of spoil arising from the excavation works.</li> <li>Soil contamination from oil spills from construction equipments.</li> <li>Sedimentation of water courses.</li> </ul>	(-2) (-1) (-1) (-1) (-1)	ST ST ST ST ST	√ √ √ √ √
			<ul style="list-style-type: none"> <li>Interruption of surface water flows during construction.</li> <li>Destruction of the vegetation cover.</li> <li>Degradation of aquatic life habitat due to water contamination.</li> </ul>	(-1) (-1) (-1)	ST ST LT	√ √ √
5.	Construction of water pipes	<ul style="list-style-type: none"> <li>Construction of mains from dam to stand pipes and</li> </ul>	<ul style="list-style-type: none"> <li>Provide employment opportunities, skilled and unskilled.</li> <li>Smoke, dust and noise generation.</li> </ul>	(+2) (-1)	ST ST	√ √

No	Main Activities	Detailed Activities Involved	Expected Impacts	Typology	Duration	Reversibility
	networks	cattle troughs.	<ul style="list-style-type: none"> <li>Mixing of soil layers during excavation and backfilling.</li> <li>Interruption of services such as water supply, electricity.</li> </ul>	(-1) (-1)	LT ST	x √
6.	construction of sanitation Facilities	<ul style="list-style-type: none"> <li>Construction of latrines and bathrooms.</li> </ul>	<ul style="list-style-type: none"> <li>Provide employment, skilled and unskilled.</li> <li>Impacts on flora and fauna.</li> <li>Smoke, dust and noise during construction.</li> <li>Occupational hazards to workers eg. Accidents.</li> <li>Soil and drainage disturbance.</li> </ul>	(+2) (-1) (-1) (-2) (-1)	ST LT ST ST ST	√ √ √ √
7.	Occupational Hazards	<ul style="list-style-type: none"> <li>All the risks that might occur during the construction of the works.</li> <li>Accidents and other health issues related to construction work crew and activities eg. Plant operation, trench excavation.</li> </ul>	<ul style="list-style-type: none"> <li>Increased risk of accidents on working sites and roads.</li> <li>Work injuries.</li> </ul>	(-2) (-2)	ST ST	x x
8.	Local Economy	<ul style="list-style-type: none"> <li>Food vending to construction workers.</li> <li>Small scale businesses.</li> </ul>	<ul style="list-style-type: none"> <li>Increased earning to the locals.</li> <li>Improved living standards and well-being associated with improved services, stability, health, empowerment, education and training.</li> <li>Enhanced economic and income generating opportunities eg. water kiosk operation, small businesses, food processing etc.</li> </ul>	(+3) (+4) (+4)	ST LT ST	
<b>Operational Phase</b>						
9.	Water supply services	<ul style="list-style-type: none"> <li>Provision of domestic commercial, institutional and industrial water that is of good quality and adequate quantity.</li> </ul>	<ul style="list-style-type: none"> <li>Water quality will be improved to meet water quality standards.</li> <li>Increased water supplies due to development of a new water source.</li> <li>The security of supply to un-serviced areas that currently depend on other sources will be enhanced through expanding and repairing connections.</li> <li>Strengthened community management of water supply in the town.</li> <li>Increased abstraction would have potential adverse effects on downstream aquatic vegetation and aquatic ecology due to low flow conditions.</li> <li>Improved performance, efficiency and higher revenue earnings for the</li> </ul>	(+3) (+4) (+4) (+3) (-1)	LT LT LT LT LT	√

No	Main Activities	Detailed Activities Involved	Expected Impacts	Typology	Duration	Reversibility
			<p>company.</p> <ul style="list-style-type: none"> <li>• Improve efficiency in water reticulation.</li> <li>• Risk of water pollution as a result of discharge of untreated wastewater.</li> <li>• Increased wastewater generation from improved water supply.</li> <li>• Improvement in water resources conservation.</li> <li>• Decreased mortality rate particularly for children due to decrease in incidence of waterborne diseases and epidemics.</li> <li>• Increase in the population due to migrants attracted to new economic opportunities.</li> <li>• Increased ethnic diversity after migration.</li> <li>• For the children, release from water collection enabling school attendance.</li> <li>• Unplanned human settlements.</li> </ul>	<p>(+4)</p> <p>(+3)</p> <p>(-3)</p> <p>(-3)</p> <p>(+4)</p> <p>(+4)</p> <p>(-2)</p> <p>(+2)</p> <p>(+3)</p> <p>(-1)</p>	<p>LT</p> <p>LT</p> <p>ST</p> <p>LT</p> <p>LT</p> <p>LT</p> <p>LT</p> <p>LT</p> <p>LT</p>	<p></p> <p>√</p> <p>X</p> <p></p> <p>√</p> <p></p> <p>√</p> <p>X</p> <p>√</p>
10.	Sanitation Services provision	<ul style="list-style-type: none"> <li>• Digging pit latrines</li> </ul>	<ul style="list-style-type: none"> <li>• Improved sanitation and hygiene for all residents.</li> <li>• Increased property values for land in the area.</li> <li>• Improved recreation and environmental aesthetics for the community.</li> <li>• Decreased mortality rate particularly for children due to decrease in incidence of waterborne diseases and epidemics.</li> <li>• Increase in the population due to migrants attracted to new economic opportunities.</li> <li>• Increased ethnic diversity due to migration.</li> <li>• Unplanned human settlements.</li> </ul>	<p>(+4)</p> <p>(+3)</p> <p>(+3)</p> <p>(+4)</p> <p>(-2)</p> <p>(+3)</p> <p>(-2)</p>	<p>LT</p> <p>LT</p> <p>LT</p> <p>LT</p> <p>LT</p> <p>LT</p> <p>LT</p>	<p>X</p> <p>X</p> <p>X</p> <p>X</p> <p>X</p> <p>X</p> <p>X</p>
11.	Occupational Hazards	<ul style="list-style-type: none"> <li>• These are all the risks that might occur during the operation phase of the systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of proper maintenance may lead to accidents eg. Drowning, pollution, broken pipes and unfenced pans/dams.</li> </ul>	<p>(-1)</p>	<p>ST</p>	<p>√</p>

No	Main Activities	Detailed Activities Involved	Expected Impacts	Typology	Duration	Reversibility
<b>De-Commissioning Phase</b>						
12.	Projection Life span expiry	<ul style="list-style-type: none"> <li>This is the end of the economic life of the project.</li> <li>The regular repair, expansion and augmentation processes.</li> </ul>				
			<b>TOTAL</b>	<b>(+36)</b>		

KEY

ST - Short term

LT - Long term

√ - Reversible

X - Non-reversible

## 7. IMPACTS MITIGATION AND MANAGEMENT PLAN

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### 7.1. Introduction

Mitigation of adverse impacts associated with the construction of the small dam should be addressed through the provision of contract conditions that:-

- i. Define the construction of small dams and onsite sanitary facilities to match increased wastewater disposal.
- ii. Define construction practices and their specifications.
- iii. Define monitoring requirements, and actions to be undertaken in the event of non-compliance.
- iv. Define contractual arrangements that will be made to incorporate awareness campaigns, provide on-site health services, and provide for the distribution of condoms and treatment of STDs. Such preventative measures are seen not only as being the most cost effective approach to limiting infection among construction workers and their partners, but has a significant effect on the local communities in the vicinity of construction camps.

Construction-related impacts should be mitigated through specifications detailing construction practice and non-compliance should invoke penalties on the part of the contractor.

The proposed construction site is not adjacent to farmlands, rivers, or residential areas. However, the site is adjacent to the route used by pastoralists and their livestock. Generated dust and construction material stored on-site during the construction could have short-term adverse impacts on the surrounding environment. Mitigation measures include watering of access routes and other dust-generation sources, construction of containing walls to control muddy runoff, and timely restoration of disturbed land to minimize the adverse impacts on the ecosystem.

Noise and vibration are generated during construction by heavy construction machinery, such as excavators, bulldozers, concrete mixers, and transportation vehicles. Generally, construction noise exceeding a noise level of 70 decibels (dB) has significant impacts on surrounding sensitive receptors within 50 m of the construction site, especially during the construction of the water distribution system.

There will be a relatively large workforce during the construction activities. The majority will probably be from outside the immediate neighbourhood, living in temporary quarters. Such conditions provide a favourable environment for the propagation of disease, exacerbated by the impacts of noise and dust. Efficient sanitation must be maintained and monitored, and health services should be available.

### 7.2. Impacts Mitigation Measures

This is aimed at identifying mitigation measures for negative impacts already identified so that the mitigation measures are incorporated in the water and sanitation project design. The mitigation measures will, on the one hand, eliminate or offset adverse environmental and social impacts or reduce them to acceptable levels and, on the other hand, reinforce measures for enhancements. Feasible, cost-effective measures are proposed.

The strategies employed for impact mitigation are avoidance, reduction and remedy as suggested in Table 7-1.



Table 7-1: Proposed Environmental Mitigation Plan

Impact	Mitigation measure to be taken	Project Phase	Responsibility	Cost
Land Acquisition	Pay relevant Fees to Kenya Forest Service	Planning, Construction and Operation and Maintenance Phase	NWSB, Contractor, KFS	BOQ
Community Resisting the project	Sensitization	Continuous	NWSB, Samburu County Government and KFS	BOQ
Water Resources depletion	Catchment protection by exercising the following: <ul style="list-style-type: none"> <li>Promoting an effective water resource management program.</li> <li>Initiate afforestation and agro- forestry program for soil and water conservation.</li> <li>Initiate community capacity building on water management, sanitation, operation and maintenance.</li> <li>Ensure that environmental flow requirements are met by releasing steady and adequate flow from the dam reservoir.</li> </ul>	Pre-construction/Construction phase/Operation Phase	Contractor, NWSB, WRMA, DFO & DEO (Samburu East)	BOQ
Dust generation	<ul style="list-style-type: none"> <li>Enclosing demolition sites.</li> <li>Spraying water on dusty roads.</li> <li>Covering or enclosing transportation vehicles, controlling the speed of vehicles, and selecting transportation routes to minimize impact on dust sensitive receivers.</li> <li>Covering or watering open spoil or storage sites.</li> <li>Minimizing on-site storage time of construction materials.</li> </ul>	Construction	Contractor	BOQ
Noise generation	<ul style="list-style-type: none"> <li>No construction using heavy machinery, from 22:00 to 6:00 Hrs, near settlements and boarding schools.</li> <li>Non-discretionary use of noisy machinery within 50 m of settlements and boarding schools.</li> <li>Good maintenance and proper operation of construction machinery to minimize noise generation.</li> <li>Installation of temporary sound barriers if necessary.</li> <li>Selection of transport routes for large vehicles to avoid settlements and schools.</li> </ul>	Construction	Contractor	BOQ
Mixing of soil layers during excavation and backfilling	<ul style="list-style-type: none"> <li>Top soils should be stock-piled separately from subsoils. After completion of work the top soils should be spread over those areas which can be restored in order to facilitate natural regeneration.</li> </ul>	Construction	Contractor	BOQ
Soil erosion through wind and runoff	<ul style="list-style-type: none"> <li>Protective structures should be used to avoid small-scale landslides where soil erosion potential is high eg. Gabions and stable slopes.</li> </ul>	Construction	Contractor, DAO and DEO (Samburu East)	No Costs
Soil and drainage disturbance	<ul style="list-style-type: none"> <li>Avoid construction during heavy rains.</li> <li>Planting of conservation vegetation to control erosion and sedimentation.</li> <li>The drainage facilities should be cleared periodically so as to ensure water flow.</li> </ul>	Construction	Contractor	BOQ

	<ul style="list-style-type: none"> <li>Avoid hampering surface water drainage and plan for curative measures after construction.</li> </ul>			
Soil and water contamination from construction and plant equipment	<ul style="list-style-type: none"> <li>No pollutants should be allowed to drain into water courses (this includes sewage and litter).</li> <li>In case of accidental spills, well-coordinated emergency and remedial measures should be put in place.</li> </ul>	Construction	Contractor	No cost
Water contamination of reservoir water	<ul style="list-style-type: none"> <li>Fencing of the dam.</li> <li>Educate the local population on sanitary issues such as the use of pit latrines.</li> </ul>	Pre-construction/Construction phase/Operation Phase	Contractor, NWSB, WRMA, DWO, DPHO (Samburu East)	BOQ
Sedimentation of water courses	<ul style="list-style-type: none"> <li>Care should be taken to minimize and manage the work area to control siltation.</li> </ul>	Construction	Contractor	BOQ
Sedimentation of the dam	<ul style="list-style-type: none"> <li>Regular desilting.</li> <li>Increase of ground cover.</li> </ul>	Pre-construction/Construction phase/Operation Phase	Contractor, Dam Management Committee, WRMA, DWO, DEO (Samburu East)	
Degradation of air quality by vehicular emissions	<ul style="list-style-type: none"> <li>Construction and equipment emissions to be kept within reasonable limits by maintaining equipment to manufacturer's specifications.</li> <li>Contractors to be encouraged to use unleaded petrol and low sulphur diesel for all vehicles and equipment.</li> </ul>	Construction	Contractor	BOQ
Impacts on flora and fauna from site clearing activities	<ul style="list-style-type: none"> <li>Temporarily-used land (eg. during surveys, pipe laying, and vehicle-maintenance areas) will return to its original use upon completion of works.</li> <li>Ensure no trees are removed, but if they are, replanting of indigenous plants and trees should be done.</li> <li>Ensure the required construction period and area is as small as possible so as not to interfere with the fauna breeding periods.</li> </ul>	Construction	Contractor	BOQ
Spread of malaria and communicable diseases such as HIV/AIDS, STD's	<ul style="list-style-type: none"> <li>Implement HIV/AIDS prophylactic treatment through appropriate health promotion through wide distribution and promotion of condom use, improve employment opportunities for affected persons and provision of family accommodation for workers.</li> <li>Where possible, employ people whose families are nearby.</li> <li>Ensure that water supplied is accompanied by appropriate sanitation facilities.</li> <li>Provide information, education and communication about safe use of drinking water.</li> <li>Environmental management for vector control, use of bed nets and repellents, focal insecticide and molluscicide</li> </ul>	Construction and Operation	Contractor, NWSB, DMOH and Water Service Provider	No additional costs

	<p>application, covered water storage, reduced domestic storage, functional drainage.</p> <ul style="list-style-type: none"> <li>• Work to minimize or altogether eliminate mosquito breeding sites.</li> <li>• Provide appropriate human and solid waste disposal facilities.</li> <li>• Assure a continuous water supply.</li> </ul>			
Gender imbalance in employment opportunities	<ul style="list-style-type: none"> <li>• Give equal opportunities for both men and women for skilled and unskilled work.</li> <li>• Expose and involve women in construction and maintenance activities in an effort to transfer required skills to them eg. Engineers, contractors and administrators.</li> <li>• Involve women groups in environmental management of the works such as construction of gabions.</li> <li>• Enhance gender sensitivity and reduce gender discrimination in construction activities.</li> </ul>	Construction and Operation	Contractor, NWSB	No additional costs
Migrants influx searching for employment	<ul style="list-style-type: none"> <li>• Priority should be given to employing staff from the neighbouring areas. This will minimise community conflicts, spread of diseases and influx of migrants.</li> </ul>	Construction	Contractor	No Cost
Sludge disposal operations	<ul style="list-style-type: none"> <li>• Once pit latrines are full, the wet sludge will need to be exhausted and the dried sludge can be used as a soil conditioner in agricultural farms or disposed of into controlled dumpsites in a safe manner, preventing contamination of delivery routes and landfill sites.</li> </ul>	Operation	Local WRUAs, Dam Management Committee, area MCA	
Environmental awareness	<ul style="list-style-type: none"> <li>• There is a need for increased environmental awareness among all the stakeholders, improved regulation of livestock, comprehensive environmental planning and management, and creation of local partnerships for environmental projects to address the environmental problems in the area that may directly affect the status of available water.</li> </ul>	Construction and operation	NEMA & DEO (Samburu North)	No Cost

### 7.3. Impact Mitigation Costs

Proposed mitigation measures and associated cost estimates can be included in the Engineering Bills of Quantities (BOQ) for the project and the Engineer's estimates. The BOQ should also include the cost of supervision for the implementation of mitigation measures. Table 7-3 is an illustration of the Bill of Quantities for environmental mitigation.

Table 7-2: Bill of Quantities for Environmental Mitigation

No.	Description	Unit	Quantity	Rate Ksh	Amount Ksh
1.	Provide a lump sum for environmental mitigation measures to be used as directed by the Engineer.				
2.	Include percentage of item above for contractor's overheads and profit.	%			
3.	Grass over side slopes in fills and cuts.	M <sup>2</sup>			
4.	Back filling of trenches as directed by the Engineer to the recommendations of the EIA.	M <sup>3</sup>			
5.	Provide and erect 1.5m high fences upheld with concrete posts at 2m intervals around the dam as directed by the Engineer.				
6.	Provide, plant, water and care for all vegetation until firmly established as directed by the Engineer as EIA specification.	No.			
<b>TOTAL</b>					

It is crucial that all mitigation measures being implemented by the contractor be done in close association and supervision of NWSB, for purposes of future mitigation, monitoring and elevation.

## 8. ENVIRONMENTAL MONITORING PLAN

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### 8.1. Introduction

An Environmental Monitoring Plan (EMP) is used when the objective is to check-up on parameters. An EMP is a periodic or continuous control of the environmental variables so as to follow the status and evolution of the pre-established environmental components and systems, and to identify the modifications and actions that must be carried out to maintain or recover specific environmental conditions. The EMP focuses on two generic areas: institutional strengthening and training, and environmental monitoring.

### 8.2. Institutional Strengthening and Training

This will ensure that EIA is completely integrated into the activities of the organization. This will help in future environmental auditing and monitoring activities. An organogram needs to be set up with clear mandates and facilities for purposes of environmental monitoring.

### 8.3. Environmental Monitoring

Environmental monitoring will ensure that:

- i. The procedures recommended in the approved EIA report are adhered to by the various agencies;
- ii. Environmental, social mitigation and enhancement schemes are well understood and communicated to all involved parties, including the general public;
- iii. Proposed environmental and social remedial measures are implemented during the project execution stage;
- iv. Evaluation is made of the effectiveness of environmental and social remedial measures.

A detailed EMP will evaluate the extent and severity of environmental impacts as compared to the predicted impacts, the performance of the environmental protection measures and compliance with related rules and regulations, the trends of impacts and the overall effectiveness of the project EMP.

The EMP should be carried out by qualified staff with equipment and technical capacity to monitor the aquatic, air, and physical environment (noise), soil and receiving water conditions, solid waste disposal, industrial pre-treatment, water source pollution control and traffic conditions. When any complaints are received from the public, monitoring staff will immediately conduct additional inspections and tests carried out in accredited laboratories.

Table 8-1 presents the potential indicators that will be used to monitor the implementation of the project. The indicators are selected according to the project context and major anticipated impacts.

Table 8-1: Environmental Impacts Monitoring Plan

Environmental Component	Indicators: Measures taken or to be taken	Monitoring frequency	Monitoring Point
Atmosphere	A) Construction Phase (i) Monitoring Item: Dust	Once/week for 1 day	Main construction sites and materials transportation roads near sensitive points and areas.
	(B) Monitoring Standard: Atmospheric Monitoring Standard Issued by NEMA.		
Noise	(A) Construction Phase (i) Monitoring Item: Noise	Once/week	Construction sites within 50m of settlements.
	(B) Monitoring Standard: Existing Noise Standard issued by NEMA.		
Water Quality	(A) Construction Phase (i) Monitoring Item: SS, Oil & E. Coli	3 times/year for two times/day	2 points
	(B) Operation Phase (i) Monitoring Item: SS & Oil	Once/year	
	(C) Monitoring Standard: Water Quality Standards issued by NEMA.		

## 9. PUBLIC CONSULTATIONS

### 9.1. Introduction

For infrastructure projects having potential impact on the environment, extensive public participation is a legal requirement. Public participation allows the local community to fully understand objectives and implementation of the proposed project, the potential adverse and beneficial impacts and associated mitigation measures. One of the purposes of public participation is to understand the habits, preferences and needs of the affected persons.

### 9.2. The General Public

Information from the public was obtained through group interviews and individual interviews. The general public highlighted several key aspects that were to be considered while implementing the development.

A summary of the worries and issues discussed by the beneficiaries are listed below:

- i. Whether the dam would be able to hold enough water to serve the community during the dry seasons.
- ii. Drowning of people, livestock and wildlife in the dam reservoir.
- iii. Denying livestock and wild life the right of way by fencing of the reservoir and water points.
- iv. Conflicts between wildlife and human beings.
- v. Lack of proper sanitation facilities at water points.
- vi. Increased incidences of malaria and water-borne diseases.

### 9.3. Key Stakeholder

#### 9.3.1. Location and Scope of Work

Wamba Dam project is located in Samburu County within Wamba Forest Station in the Forest Reserve. The project will affect 22.88Ha of Mathews Range Forest with a coverage area of 93,765.50 ha (Refer figure 1-1). This translates to 0.024 % of the forest cover to be affected by the project. The proportion of forest cover occupied by the dam is too small as a result, there shall be insignificant negative impact on the forest ecosystems. The table below summarizes the area requirement for the project component.

S/N	Component name	Forest Area in Hectares	Area to be affected in Hectares	% age of forest to be affected
1.	Dam	93,765.50	15.68	0.0167
2.	Treatment Works		4.2	0.004
3.	3Km Treated Water Pipeline,		3.0	0.003
Total			22.88	0.024

The project is being implemented by the Northern Water Services Board with Bitat Limited as the project contractor.

Construction works of Phase I commenced on 16<sup>th</sup> November, 2017 and is expected to be completed on 16<sup>th</sup> November, 2018 at a contract sum of Kshs. 106Million. The project is at 45% completion and is intended to supply potable and adequate water to 7,020 residents of Wamba Town and its environs upon completion.

The scope of work for Phase I entail construction of a 15m high zoned rock fill coffer dam of capacity 257,335.25m<sup>3</sup> including 3km access road. Phase II will entail construction of the main dam of capacity 3,714,985m<sup>3</sup>.

### **Joint Review**

In April, 2018, a Joint Ministerial Technical Team whose members were Ministry of Water and Irrigation and Ministry of Environment and Forest to explore special appeal raised by Ministry of Water for exemption from specific provisions of yhe moratorium on logging in public and community forests( Refer Section 11.2).

The task force recommended exemption of construction of four dams in public forest among them Wamba mega Dam.

The Ministry was requested to proceed with construction provided it pays Kshs 1.3million and implement the EMP contained in this Report which has been approved by KFS



## 10. CONCLUSION

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Though the EIA Study has identified impacts on flora and fauna in the short time, the construction of Wamba Mega Dam has been found to have major impacts on flora, fauna and residents of Wamba Town hence the need to construct the dam as priority and encounter the climate change effect which are threatening to get out of hand as witnessed in most part this year during January to march where most rivers dried and the little that flowed becomed a congregation of human and wildlife.

## 11. ANNEXES

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### 11.1. List of References

#### a. Documents and Reports

- i. Samburu County Intergrated Development Plan (2013-2017)

#### b. Laws and Regulations

- ii. The Environmental Management and Coordination Act, 1999 No. 8 of 1999.
- iii. The Environmental Management and Coordination Act, 1999 No 8 of 1999, Second Schedule (s.58 (1), (4)), No. 1 (major changes in land use and out of keeping with the surroundings) and 4 (water resources and water diversion).
- iv. Environmental Management and Coordination Act (No. 8 of 1999) Environment Impact Assessment Guidelines and Administrative Procedures. November 2002.

#### c. Standards

- v. Environmental Management and Coordination, (Water Quality) Regulations 2006. Fifth Schedule: Standards for Effluent Discharge into Public Sewers.
- vi. Environmental Management and Coordination, (Water Quality) Regulations 2006. First Schedule: Quality Standards for Sources of Domestic Water.
- vii. Environmental Management and Coordination, (Water Quality) Regulations 2006. Second Schedule: Quality Monitoring for Sources of Domestic Water.

**11.2. Joint Ministerial Technical Team Report**



**REPUBLIC OF KENYA**

**Joint Ministerial Technical Team Report  
By**

---

**Ministry of Water & Sanitation  
And  
Ministry of Environment & Forestry  
On**

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**Special Appeal by the Ministry of Water and Sanitation for  
Exemption from Specific Provisions of the Moratorium  
on Logging in Public and Community Forests**



**APRIL 2018**

## EXECUTIVE SUMMARY

Some of the Vision 2030 Water Projects currently under implementation have been adversely affected by the 90 Days National Moratorium on logging being enforced by Kenya Forest Service. The Ministry of Water and Sanitation has sought intervention of the Ministry of Environment and Forestry in addressing concerns by Water Contractors and affected State Corporations.

In consideration of matters raised to the Ministry of Environment and Forestry; a Joint Ministerial Technical Team was tasked to undertake aerial assessment and validation of progress of construction works in Chemususu and Itare Dam Water Supply Projects in Forested reserves, review relevant project briefs and, recommend appropriate immediate interventions.

It was noted that the on-going National Moratorium commenced on 24<sup>th</sup> February, 2018 and is effectively being enforced by the Kenya Forest Service. Access to Forested reserves and community forests are restricted and Logging has been prohibited. It is noted, reported cases of illegal access to forested areas and unwarranted felling of trees has greatly been reduced and awareness of environmental conservation has been elevated as a National Agenda. Authorizations and Permits issued by Kenya Forest Service for the select Dam Water Projects have been suspended and affected Contractors have indicated intention to lodge contractual claims for idle labor and machineries. Generally, there is an outcry by dam contractors all over the country.

Nevertheless, the Moratorium is delivering on its objectives and more efforts are needed to facilitate the Taskforce appointed to review the performance of the Forest Sector Governance. The main aim is to enhance sustainable management, restoration and protection of public and community forests and water catchment areas with a view to increasing forest cover to 10% or more.

Further, it is recommended that favourable consideration is made to allow affected ongoing water projects namely Itare, Chemususu, Wamba and Yamo to proceed with construction while the National Moratorium on Logging is enforced. Construction activities to be considered include clearing way-leaves for pipelines and access roads, as well as geo-technical and hydrological investigations that are part of detailed design review of the projects. The same exercise to be carried out for Bosto dam and other affected water projects in Forest Reserves.

In order to mitigate against environmental impact associated with the dam infrastructure, the design of the projects incorporated a comprehensive component on conservation especially on tree planting. Going forward, it is proposed that the Water Sector engages with the Ministry of Environment and Forestry to develop an integrated policy framework for apt water infrastructure development and Forest Resource Management.

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## LIST OF ABBREVIATIONS

CCF	Chief Conservator of Forests
CEOs	Chief Executive Offices
EIA	Environmental Impact Assessment
JMTT	Joint Ministerial Technical Team
KFS	Kenya Forest Service
ToR	Terms of Reference
RVWSB	Rift Valley Water Services Board
GoK	Government of Kenya
MoWS	Ministry of Water and Sanitation
MoE&F	Ministry of Environment and Forestry
NWCPC	National Water Conservation and Pipeline Corporation
NWSB	Northern Water Services Board
Ha	Hectares
KShs	Kenya Shillings
Km	Kilometres
m	Metre
mm	Millimetres
masl	Mean Average Sea Level

# 1.0 Introduction

## *1.1 Background Information*

Kenya is described as a water-scarce country due to limited national endowment and the needs of a growing population. This problem has been compounded by water resources degradation and low investments in infrastructure development, and maintenance and operations. The water sector has the potential to substantially improve the lives of Kenyans by ensuring access to clean water and acceptable sanitation services. Water is central to the achievement of Kenya's socio-economic development goals. The mandate of the Ministry of Water and Sanitation is therefore, to protect, harness and develop potential of water resources to ensure availability of quality and adequate water for all. This will provide an enabling environment in the development of the four pillars; - Universal health, Housing, Manufacturing and Food Security.

The Forest Sector is critical to National Development in its support to both production and service sectors; Energy, Agriculture, Manufacturing, Industry, Eco-tourism, Health, Education and Research and especially sustainable water resource management and conservation.

Despite the importance of the Forest Sector, the status of its protection, management and conservation is in a deplorable state in both public and community/private lands. This has led to the serious frequent droughts, floods, drying up of rivers, wells, springs and lowering of water tables. Consequently, this necessitated the government to institute a Moratorium on logging in public and community forests to allow re-assessment and rationalization of the entire forest sector in the country.

The Ministry of Water & Sanitation is currently implementing several Vision 2030 water supply projects through Water Services Boards established under the Water Act 2002. The Boards have been granted way leaves by the Kenya Forest Service and are being severely affected by the enforced Moratorium on Forest logging. Of note this has greatly affected the progress of works on sites within forested areas causing undue delays and unforeseen contractual claims by Contractors and Supervising Consultants.

## *1.2 Dam Development in Forest Reserves*

Kenya Forest Service (KFS) received requests from several water institutions under the Ministry of Water and Irrigation for authority to access various gazetted forests in the country to construct water dams for water supply schemes, irrigation and generation of hydropower.

Prudent conservation principles and policies do not support conversion of water catchment areas to surface water storage as dams or reservoirs in forest reserves. Informed by this conservation principle, Board of Directors of KFS supported the policy of not authorizing construction of any dam inside gazetted forests across the country. Several requests including the proposed construction of Nandi Forest Multi-Purpose Dam within South Nandi Forest Reserve by the Ministry of Regional Development in the Year 2009 was turned down by the Board.

Despite the current ban on construction of the dams inside the forests, the water agencies namely: The National Water Conservation and Pipeline Company (NWCP), Northern Water Services Board (NWSB), Tana Water Services Board (TWSB) and the Rift Valley Water Services Board appealed to the Chief Conservator of the Forests for reconsideration. The CCF conveyed the decision of the KFS Board to the three CEOs of the above named Water Services Boards.

On 7th April 2018, the team visited Itare Dam and Chemususu Dam and made several inquiries with project staffs and community and made site observations on the project developments. Additional information contained in this report was gathered through review of various reports that have been submitted by technical officers on Yamo; Wamba and Bosto Dams. The taskforce also carried out a situation analysis of the stated dam construction projects as it relates to the impacts of the 90-day moratorium on logging of timber from public and private forests. Finally, the report provides recommendations on how to resolve the associated constraints on dam construction caused by the 90-day moratorium.

### ***1.3 Appeal by the Ministry of Water and Sanitation on exemption from some provisions of the Moratorium***

The Ministry of Water and Sanitation requested the Ministry of Environment and Forestry vide letter Ref: WD/3/3/1282/VOL. II (82) dated 19<sup>th</sup> March 2018 to allow for continuity in dam construction works located in forest reserves from the provisions of the moratorium on logging within public and community forests. The specific provisions that affect the said dam construction are:

- i. Restriction of access to the forest reserves in the dam sites and along pipeline wayleaves.
- ii. Stoppage of cutting of trees within the dam sites and pipeline wayleaves.

#### *1.3.1 Consideration of the Appeal*

In response to the appeal, both the Cabinet Secretaries held a consultative meeting 5<sup>th</sup> April, 2018 to consider the request in order to find the best way forward on special exemption to allow for authorized works to proceed in the affected forest reserves. During the consultations it emerged that there was need to pursue issues of dam construction in forest reserves in a more comprehensive approach for long term sustainability. In this respect the two Ministries agreed to work together and strengthen their partnership as follows: -

#### *1.3.2 Phase I: Propose a Way-forward for the Four Dams as a Priority Case*

During the consultative meeting it was resolved that Phase I would involve carrying out an assessment on the implications of the Moratorium in the four priority dams namely Itare, Chemususu, Bosto and Yamo as follows: -

- a) Make observations on progress of construction works in the four dams
- b) Analyze the implications of the provisions of the moratorium in respect to implementation of dam projects within forest reserves.
- c) Make recommendations for policy decision.

#### **Timelines for Phase I**

Considering the urgency of the matter, a joint technical team was tasked to carry out the work urgently and report to both the Principal Secretaries on 9<sup>th</sup> April, 2018 who shall thereafter present the report to both the Cabinet Secretaries on 10<sup>th</sup> April, 2018.

#### *1.3.3 Phase II: Preparation of a joint framework for development of dams within the forest reserves*

EIA for Wamba Mega Dam Project | BY ENG. B.I. KASABULI -11<sup>th</sup> October 2018



At the consultative meeting, it was realized that the Ministry of Water and Sanitation has proposed to develop over 23 dams in the forest reserves. In order to realize the programs envisaged in the development of dams in the forests, the two Ministries shall work together to prepare a comprehensive framework to be applied for consideration of development of dams in forest reserves.

### *1.4 Appointment and Composition of a Joint Ministerial Technical Team*

The Cabinet Secretaries underscored the urgency and importance of the appeal of MWS and constituted a Joint Ministerial Technical Team to carry out the tasks envisaged under phase I and II.

The joint Ministerial Technical Team was constituted as follows: -

- |   |          |
|---|----------|
| (i) Mr. Gideon N. Gathaara, Forestry Conservation Secretary             | Chairman |
| (ii) Eng. SAO Alima, Ag. Water Secretary                                | Member   |
| (iii) Mr. Esau Omollo, Senior Deputy Chief Conservator of Forests, KFS, | Member   |
| (iv) Eng. Jacob Mwakio, Engineer I (Water & Sewerage)                   | Member   |
| (v) Eng. Wilfred Amwata, Engineer I (Water & Sewerage)                  | Member   |

The team was instructed to start the work with immediate effect, undertake an aerial assessment and validate on the ground the status of construction works in relation to the moratorium. It was agreed in the meeting that MWS would meet all the costs related to the assignment including hiring of helicopter services.

## 2.0 Interpretation of the Terms of Reference

The JMTT interpreted the scope of Phase I assignment and identified specific Terms of Reference (ToR) to include;

- Carrying out aerial survey of the dam sites and wayleaves
- Ground validation on the status of construction works
- Consultations with technical officers of Water Boards, KFS and the contractor
- Seek views from the community leaders in the project areas
- Making inquiries on the current constraints to progress of work and to relate the same to the 90 - day Moratorium on logging within public and community forests.
- Gathering relevant information on the subject matter
- Preparing the assignment report

At the end of the assignment, the team was to analyze the findings and compile a report to be submitted to the Principal Secretaries to inform policy decisions.

### *2.1 Objectives*

The main objective of the assignment was to carry out assessment on the impact of the Moratorium on the four dams currently under construction within the forest reserves.

### *2.2 Methodology*

The JMTT developed a program to facilitate the carrying out of the assignment and adopted the following methodology: -

- Aerial and ground validation
- Discussions and consultations with the relevant parties
- Review of relevant project briefs
- Identification and interpretation of provisions of the Moratorium as they relate to the four ongoing dam projects in terms of associated contract costs and time overrun.
- Identification of the level of compliance and enforcement of provisions of the Moratorium.
- Preparation and submission of the assignment report in accordance with the ToR and timelines.

## 3.0 Description of the Affected Dam Projects

### 3.1 Itare Dam Water Supply Project

The Itare dam site is located in Kuresoi North Constituency, Nakuru County. Treated water will be transmitted by a pipeline traversing parts of Kuresoi, Kericho, Kipkelion, Molo and Nakuru. The pipeline will have provisions for water supply off-takes to towns of Chepsir, Chepseon, Kedowa, Molo, Elburgon, Salgaa and Njoro. A total of 43.94Km of the Water Transmission Pipeline is designed to traverse Ndoinet and Londiani Forest Reserves as shown in the map in Appendix 1.

The Project is being implemented by Rift Valley Water Services Board with CMC Di Ravena as the project contractor and supervised by H.P. Gauff Ingenieure GmbH. Construction works commenced on 6<sup>th</sup> April, 2017 and expected to be completed on 5<sup>th</sup> April, 2021 at a contract sum of KShs. 28,973,739,492. The project is at 23% completion and will connect 1,015,000 people to clean, reliable and safe drinking water upon completion.

The scope of the project entails five main components as follows: -

- a) 57m high dam and Intake works
- b) 1.8 km raw water pipeline and 113Km treated water transmission
- c) 100,000m<sup>3</sup>/day water treatment works
- d) 14.5Km bulk transfer tunnel
- e) 4 new reservoirs, rehabilitation of existing reservoirs and 32km water distribution pipelines.

In order to conserve the forest, it is proposed as a mitigation measure to develop programmes for catchment rehabilitation by planting vegetation and trees for catchment replenishing and project sustainability.

### 3.2 Chemususu Water Supply Project

Chemususu Water Supply Distribution Project is located in Eldama Ravine Sub-County in Baringo County. The contract was awarded to Guangxi Hydroelectric Construction Bureau at works commenced on 27<sup>th</sup> September, 2016 and is expected to be completed on 27<sup>th</sup> October, 2018 at a contract sum of Kshs. 2,980,992,533.86. The project is at 33% complete and is intended to serve 300,000 people in Eldama Ravine and parts of Mogotio and Rongai sub-counties with clean drinking water upon completion.

The scope of the project comprises as follows: -

- a) Construction of Raw Water Gravity Main of length 0.7km and 500mm diameter
- b) Construction of new Water Treatment Works of capacity 35,000 m<sup>3</sup>/day
- c) Rehabilitation of the existing Water Treatment Works of capacity 6,000 m<sup>3</sup>/ day
- d) Construction of Clear Water Gravity Main of length 16.4Km and diameter 500mm
- e) Construction of 235Km Water Distribution Networks with diameters ranging from 400mm to 50mm
- f) Construction of 25No. Storage Reservoirs

EIA for Wamba Mega Dam Project | BY ENG. B.I. KASABULI -11<sup>th</sup> October 2018

Developing of programmes for catchment rehabilitation by planting vegetation and trees for catchment replenishing and project sustainability is proposed as a mitigation measure to conserve the forest.

### ***3.3 Bosto Dam and Water Supply Project***

The proposed Bosto Dam and water project is located in Ndoinet Forest Station, South Western Mau, Kericho County. The dam site is to be located across Kipsonoi River.

The project is estimated to Cost Kshs. 20Billion and is intended to supply potable and adequate water to 620,477 residents of Bomet County. The project is at detailed design and construction works will entail construction of a 40m dam with a capacity of 18 million cubic meters and 19.2Km raw water pipeline inside the forest that will require 470Ha of the forest.

Mitigation measures proposed is planting indigenous trees at the degraded sections of the Mau Forests Complex.

#### *Existing Reports:*

The findings and observation carried out by KFS during field assessment of the proposed Bosto Dam Project confirm the following:

- i. The site for the dam reservoir is a natural forest comprising of closed forest, bamboo, and natural glades, rich in biodiversity;
- ii. The famers adjacent to the north-eastern boundary of the proposed dam area, increasingly grow tea. Tea crop requires a regulated micro-climate which the forest provides;
- iii. Kipsonoi River emanates from the settled area before traversing through the protected natural forest. It is therefore possible to locate the dam along Kipsonoi River but outside the forest upstream of dam site 1 by acquiring the land from the farmers;
- iv. The area outside the forest upstream of dam site 1 is not densely settled. It is part of the 2001 forest excisions that are still challenged in court.
- v. Approximate cost estimate reveals that purchasing 470 Ha of land outside the forestland at an estimated cost of KES 1 million per acre would amount to KES 1.12 billion, corresponding to less than 6% of the estimated cost of the dam.
- vi. The pending studies include topographic survey to be carried out by the project proponent to determine the exact area the dam reservoir will submerge and inventory of the forest materials that will be lost when the dam area is submerged.
- vii. The Project Proponent has a EIA Licence but KFS was not consulted. Other key stakeholders, such as Rhino Ark and the IDH/ISLA currently investing in the conservation of South Western Mau, in particular on the north-eastern boundary near which the dam is proposed, have not been consulted.

### ***3.4 Yamo Dam and Water Project***

The Yamo Dam and water project is located within Leroghi Forest Reserve and Lapartuk Group Ranch near Maralal Town in Samburu County. Leroghi Forest Reserve gazetted in the year 1936 covers an area of 91,944.40 hectares. Yamo Dam is designed to occupy an area of 20.3 hectares which translates to 0.022% of the forest cover. The dam shall therefore not pose a big threat to the forest due to small proportion of the forest area occupied. The table below summarizes the area requirement for each project component.

S/N	Component name	Forest Area in Hectares	Area to be affected in Hectares	% age of forest to be affected
1.	Dam	91,944.40	12.3	0.0133
2.	Treatment Works		5.0	0.0054
3.	3Km Treated Water Pipeline,		3.0	0.0032
<b>Total</b>			<b>20.3</b>	<b>0.022</b>

The project is being implemented by the Northern Water Services Board (NWSB) with Hebei Water Conservation and Hydro Power Ltd. Construction works commenced on 6<sup>th</sup> October, 2017 and expected to be completed on 6<sup>th</sup> June, 2019 at a contract sum of KShs. 1.1Bilion. The project is at 0.5% completion and is intended to supply potable and adequate water to 70,000 residents of Maralal Town and its environs upon completion.

The scope of the project entails the following major components: -

- a) Construction of 26.10 meters high dam with a crest length of 275m and storage of capacity of 1.5million cubic metres.
- b) Construction of 15.0kw power generation plant
- c) Construction of Water Treatment Plant and 5km Treated Water Pipeline also to be located in the forest and currently under detailed design.

Replanting of trees where appropriate or where specifically stipulated by KFS is proposed as a mitigation measure to conserve the forest.

#### *Reports by KFS:*

The JMTT was not in a position to visit Yamo Dam Site but noted that KFS had visited the site and had prepared a report which indicates that:

- i. The site for the proposed Yamo Dam reservoir is along the boundary of Leroghi Forest Reserve and Lpartuk Group Ranch;
- ii. No alternative sites were identified and proposed by the project proponent (NWSB) outside the protected area;
- iii. No integrated water resources management plan was provided to understand the long-term strategy to address water needs of Maralal Town and its environs;
- iv. The proposed dam will submerge 19.5Ha of the natural forest with centuries-old cedar trees;
- v. The Chinese company awarded the contract had already entered the forest to construct the road but was stopped by the KFS staff in November 2017. A number of indigenous trees at the proposed location for the dam wall already cut;
- vi. The dam is intended to harvest the run-off water from the Leroghi Forest for supply to the beneficiaries in Maralal Town and its environs;
- vii. KFS has surveyed the site to determine the exact area of the forest will be affected by the dam reservoir is 20.3 hectares
- viii. KFS inventory of the forest materials that will be lost when the dam area is submerged is estimated to cost Ksh. 19,572,139.10;

### 3.5 Wamba (Sere Rongai) Dam and Water Project

Wamba Dam project is located in Samburu County within Wamba Forest Station in the Forest Reserve. The project will affect 22.88Ha of Mathews Range Forest with a coverage area of 93,765.50 ha. This translates to 0.024 % of the forest cover to be affected by the project. The proportion of forest cover occupied by the dam is too small as a result, there shall be insignificant negative impact on the forest ecosystems. The table below summarizes the area requirement for each project component.

S/N	Component name	Forest Area in Hectares	Area to be affected in Hectares	% age of forest to be affected
1.	Dam	93,765.50	15.68	0.0167
2.	Treatment Works		4.2	0.004
3.	3Km Treated Water Pipeline,		3.0	0.003
<b>Total</b>			<b>22.88</b>	<b>0.024</b>

The project is being implemented by the Northern Water Services Board with Bitat Limited as the project contractor.

Construction works of Phase I commenced on 16<sup>th</sup> November, 2017 and is expected to be completed on 16<sup>th</sup> November, 2018 at a contract sum of Kshs. 106Million. The project is at 5% completion and is intended to supply potable and adequate water to 7,020 residents of Wamba Town and its environs upon completion.

The scope of work for Phase I entail construction of a 15m high zoned rock fill coffer dam of capacity 257,335.25m<sup>3</sup> including 3km access road. Phase II will entail construction of the main dam of capacity 3,714,985m<sup>3</sup>.

Replanting of trees where appropriate or where specifically stipulated by KFS is proposed as a mitigation measure to conserve the forest.

#### *Reports by KFS:*

The JMTT was not in a position to visit Wamba Dam Site but noted that KFS had visited the site and had prepared a report which indicates the following: -

- i. The site of Wamba Dam reservoir is located within the Mathews Range Forest Reserve;
- ii. No alternative sites had been identified for the project outside the forest reserve;
- iii. The contractor was awarded the contract by the Northern Water Services Board but has not been allowed access to the site by KFS;
- iv. Inventory by the KFS of the forest materials to be removed at the dam submerged area is estimated to cost KShs. 1,335,834.70 and has not been paid.

## 4.0 General observations

- 4.1 Sustainable forest conservation and protection and management is critical for the long term sustainability of water resources management and development. The Kenya Constitution, 2010 underscores the need for:
- Establishing 10% tree/forest cover of the total land area of Kenya
  - Universal access to water and sanitation as a basic human right
  - The right to clean environment
  - Sustainable development which encompass forest protection, conservation and management; water resources conservation, protection and utilization. These are key enablers in realization of the big four agenda of the government.
- 4.2 The aim of the Moratorium is to allow for time to institute reforms and measures necessary to address key drivers of forest degradation and identify potential for investment.
- 4.3 There is therefore the need for strengthening strong partnerships between the forest and water sector agencies for conservation good for the Kenyan people.
- 4.4 The scope of the Moratorium imposed by GoK on logging in February 2018 covers both public and community forests. It is to be noted that the major operators involved in logging are; Saw Millers, Transmission Pole Operators, Fuel Wood Licensees and not Dam project contractors operating within forest reserves.
- 4.5 The special use license or permits issued by the KFS specify the conditions that the materials to be removed from the dam construction site and the wayleaves are the property of KFS that are disposed off through a bidding process.
- 4.6 The material authorized to be removed from the dam site and pipeline wayleave areas are normally assessed, inventoried and valued to enable the project proponent to make payments to KFS before access to the development site within the forest reserve is allowed.
- 4.7 The provisions that affect the development of dam projects within the forest reserves are: restrictions of access to the forest reserves and stoppage of cutting and removal of trees from public and community forests in respect to the Moratorium.
- 4.8 The dam projects were identified long time ago (some in 1978) as key priority projects and later emphasized as flagship under Vision 2030.
- 4.9 In order to mitigate against environmental impact associated with the dam infrastructure, the design of the projects incorporated a comprehensive component on conservation especially on tree planting.
- 4.10 Construction of the dams and pipelines in the forest reserves were going on before the imposition of the Moratorium in: Itare, Chemususu, Wamba and Yamo and the contractors are on site. Therefore, enforcement of the Moratorium has stalled the implementation of the projects with implications of:
- a) Cost overruns due to claims by contractors
  - b) Loss of jobs and livelihoods
  - c) Delay in realization of enabling the achievement of the big four government agenda

## 5.0 Specific Observations and Findings

### *5.1 Itare Dam Water Supply Project*

- a) The JMTT while visiting the dam project noted that construction was on going at the dam site which is located 3km from the Ndoinet forest reserve boundary. The Dam covers a total area of 634 acres. The land occupied by the dam was bought by the Rift Valley Water Board for dam construction. The dam capacity is estimated to be 28 million cubic metres.
- b) Inquiry by JMTT reveals that the key concerns for the RVWSB was to be allowed access to the wayleave of 10 meters wide and 38.94 kilometers length across Ndoinet Forest Reserve. The wayleave covers an additional 5 kilometers distance within Londiani Forest Reserve. The RVWSB confirmed having paid KFS Ksh. 21.5 million for both the wayleave easement and compensation for trees to be removed.
- c) The contractor on site had only worked for 9 days opening up the wayleave easement for the pipeline. The work involved cutting trees using power-saws, excavating and stabilizing the ground. Trees cut were properties of KFS and were kept at the sides of the wayleave alignments awaiting bidding and sale to pre-qualified licensees. The contractor had already cleared 6Km of wayleave before they were stopped by KFS due to the Moratorium. The contractor had programmed to take 3 months for clearing the wayleave by engaging 4 sub-contractors each with 32 employees on site.
- d) Construction of the dam and treatment works outside the forest reserve is ongoing, but work had been stopped on water pipeline section.
- e) The project contractor had written to RVWSB on intention to claim cost on idle machinery and personnel in accordance with the contract provisions.

### *5.2 Chemususu Water Supply Project*

- a) Construction of Chemususu dam begun in 2009 and was completed in 2011. At completion, water reticulation and supply was done using an old treatment plant built in 1986 to treat water sourced from a weir across Pekerra River.
- b) Construction of the new Chemususu Water Treatment Plant was ongoing at the time of the site visit. The contractor confirmed having no problems. Survey of the alignment for the bulk transfer wayleaves easements had been done. Trees along the alignment to be removed had been marked.
- c) Construction of the new water pipeline along the existing pipeline route as 7.6 Km traversing Chemususu Forest Reserve and 0.8Km in Narasha Forest Reserve. The KFS had issued a permit to RVWSB for the works on 26th August, 2016. However, due to the enforcement of the Moratorium, KFS stopped the work.
- d) On further inquiry, community leaders complained that the 10 metres width of the proposed wayleave is too wide in comparison to the existing 5m wayleave. However, the 5m wayleave was for 200mm diameter pipeline while the new wayleave is for a 500mm diameter pipeline.



Some community leaders present opposed the cutting of some 14 valuable indigenous *Podocarpus spp.* However, the community is in full support of the project.

- e) KFS had issued a permit to RVWSB for implementation of the project and received payment of KShs. 203,000 for the wayleave. However, compensation for tree to be removed along the wayleave is yet to be valued because inventory of the trees is yet to be undertaken to facilitate payment to KFS.

## 6.0 Implication of the Moratorium on Construction Works of Dams

The Government of Kenya directive of 24<sup>th</sup> February, 2018 imposed a 90-days Moratorium on logging in public and community forests to allow reassessment and rationalization of the entire forest sector in the country. This directive was occasioned by the unprecedented serious and acute water crisis in the country during dry spells and witnessed eminent over logging of forest plantations in public and community forests. Full content of the directive is provided here as Appendix 2.

To implement the moratorium, the following provisions shall be complied with by all Government Agencies, Stakeholders and Members of the Community operating in the forests.

- (i) Prevent all forms of logging in all public forests and in all community forests countrywide;*
- (ii) Prohibit access to state forests except for tree planting purposes;*
- (iii) Prevent transportation of forest products from public and community forests;
- (iv) Enhance intelligence gathering and management to achieve pre-emptive objectives of the moratorium;
- (v) Full implementation of forest crimes monitoring systems at all management levels;
- (vi) Provide daily operational briefing on implementation of the moratorium;
- (vii) Investigate, arrest and prosecute offenders and confiscate and take custody of exhibits, tools and equipment used for commission of offences;
- (viii) Take disciplinary action for officers abetting illegal activities in forest reserves.

Key provisions of the Moratorium that affect dam construction in public and community forests are ***prohibition of access to the forest for all activities except for tree planting and the stoppage of logging within public and community forests.*** KFS being an institution mandated by law to manage forest resources and enforce provisions of the Forest Conservation and Management Act 2016, carried intensified patrols, inspections and law enforcement Country wide as directed through the 90-days moratorium.

Consequently, the dams which were under various stages of construction within the forest reserves had work activities related to access into the forest and cutting of trees stopped. These has led to contractors being denied access to dam sites within the forest reserves and stopped from opening roads and wayleaves for pipelines through the forests.

Specifically, denial of access into the forest dam sites and stoppage of cutting of trees has affected Contractors at Wamba Dam and Water Project in Wamba Forest Station within Mathews Range in Samburu County. Also affected are the contractors of Yamo Dams and Water Projects in Leroghi Forest Station within Leroghi Forest in Samburu County.

The development of wayleave easement for pipeline covering 10 metres wide by 40 km length in respect to Itare Dam Construction has stalled. The contractors have been denied access into the forest and not allowed to cut any trees within the wayleaves. Figure 1 shows the stage of the 6 km of wayleave that was cleared before stoppage by KFS.

Figure 1: Itare Dam Pipeline Wayleave already Cleared in the Background.



Similarly, at Chemususu Dam, the contractor has been denied access into the forest to cut trees, clear the wayleave covering 10 metres by 10 Km length for construction of bulk water distribution pipeline from the dam to the water treatment plant. Figure 2 shows portion of the demarcation of the wayleave alignment to join Chemususu Dam to the Water Treatment Plant under construction.

## 7.0 Analysis of the Findings

The impact of implementation of the 90-days moratoriums has resulted to stoppage of construction work for specific dams in the forest reserves. Site observation and technical reports confirms that Itare; Chemususu; Yamo and Wamba dams and related Water Projects have been adversely affected by denial of access and stoppage of tree cutting and clearing of wayleaves.

Each dam project experiences unique challenges resulting from the 90-days moratorium. Informed by our findings, we now submit that the consequences of the 90-days Moratorium shall lead to the following scenario:

- i. Contractors working on the affected dam sites and pipeline wayleaves have their work stopped and contract terms likely to be breached.
- ii. The Employees who had been engaged to carry out the works get idle and face the possibility of being dismissed and therefore livelihood means curtailed.
- iii. There shall be a likelihood of project cost overruns, several contract variations and litigations between the dam projects proponents and the contractors during the implementation. The work value for money shall have been lost.

### *7.1 Challenges in Enforcing the Moratorium*

- a) The communication of the Moratorium refers to logging in public and community forests and no reference was made to water projects with activities in forest reserves that had earlier been given authority by KFS and entry permits issued.
- b) Prohibition of access to the forest except for tree planting is also very problematic to enforce. The reason being forests are accessed for various legitimate usages that includes: ecotourism activities, growing of crops under plantation establishment and livelihood schemes; community livestock grazing and wind power generation.
- c) KFS has been subjected to several difficult litigations because of refusal to facilitate movement permits for forest products from private farms. This scenario is made to be complicated due to the difficulties experienced by enforcement officers in establishing origin of the materials due to the weak chain of custody system in use for the identification of the forest products in the Country.

## 8.0 Conclusion and Recommendations

From the foregoing observations, the team made the following conclusions and recommendations: -

- a) The Ministry of Environment and Forestry, through KFS, has undertaken to enforce the Moratorium to ensure no access to the Forest Reserves other than for tree planting and stoppage of logging in the Forest Reserves for the project sites visited.
- b) In the case of the Itare Dam and Chemususu Water Transmission Pipeline where permits had been issued by KFS allowing construction of the pipelines traversing the Forest Reserves considerations be made to grant exemption from the provisions of the Moratorium on access to the Forest Reserves and clearing of the wayleaves subject to the following: -
- c) In the case of Chemususu, inventory of trees to be removed should be finalized and payments made by RVWSB. In addition, cutting of high value indigenous trees such as *Podocarpus spp* which had been marked be avoided.
- d) In the case of Wamba and Yamo projects where no objection letter has been issued to Northern Water Services Board, the process of issuance of special use license be finalized. Taking cognizance that Dams are intended to serve communities in ASAL area prone to water conflicts and food security, the JMTT recommends consideration be made to grant exemption from the provisions of the Moratorium on access to the Forest Reserves and clearing of the wayleaves upon fulfillment of Forest Conservation and Management Act, 2016.
- e) In the case of Bosto Dam, as noted in the KFS report, a no objection letter has been issued for dam site 1. However, JMTT was not in a position to visit the dam site and there is urgent need to verify and validate information of the report on the ground. Furthermore, the no objection letter calls upon National Water Harvesting and Storage Authority to engage KFS further in moving the process forward.
- f) There is need to develop a policy framework to guide future development of dams in forested reserves detailing conservation measures and enforcements.

## 9.0 Way-forward

The Issues Raised and Recommendations provided in this report are of National importance in long term sustainable water and forest conservation and in particular the delivery of the big four agenda.

In this regard, there is need to move expeditiously to: -

- i. Jointly come up with a Cabinet Memo to guide in the development of dams in forest reserves as a matter of urgency and in particular incorporate a comprehensive component of forest rehabilitation and conservation and develop a policy on projects inside gazetted Public and Community Forests.
- ii. Special considerations be accorded to grant the appeal by exempting the ongoing dam water projects (Itare, Chemususu, Yamo, Wamba and Bosto) from the two provisions of the Moratorium to allow continued construction works where permits had been given by KFS subject to the following general conditions: -
  - a) Felled stocks must be secured at the site to await removal by KFS

- b) All felled stocks shall remain the property of KFS
- c) A system to be put in place to document those who enter and exit the site on a daily basis. KFS officers to be stationed on site to undertake inspection.
- d) Ensure that all mitigation measures as outlined in the NEMA certificate are implemented.
- e) Contractor to adhere to the working hours as provided for in the law (i.e. from 6am to 6pm)
- f) Monthly report submitted to the technical team-PSs-CSs for compliance

In addition, for Chemususu Dam Water Supply Project, a joint inventory should be done and payments to be made within 7 days by **23/4/2018**, wayleave to be modified so as to preserve the 14 indigenous trees identified by the community and in accordance with conditions of the permit the nursery and the rangers' camp should be relocated at the cost of RVWSB. Relocation to start in 7 days and should be provided with water.

- iii. In the case of Wamba and Yamo projects the process of issuance of special use license be finalized by ensuring payments of Kshs. 1.3M and Kshs. 19M respectively are paid to KFS for the stock to be felled during construction of the projects.
- iv. For Bosto Dam, JMTT to visit the site and prepare a comprehensive report and submit to the two cabinet secretaries by 19<sup>th</sup> April,2018.

## 10.0 Report Certification

The assignment was undertaken by the officers indicated below who also prepared and submitted the Report.

S/N	Name	Organization/Designations
1.	Mr. Gideon Gathaara (Chairman)	MoE & F - Forestry Conservation Secretary
2.	Eng. SAO Alima (Member)	MoWS – Ag. Water Secretary
3.	Esau Omollo (Member)	KFS – Senior Deputy Chief Conservator Forestry
4.	Eng. Jacob Mwakio (Member)	MoWS – Engineer I
5.	Eng. Wilfred Amwata (Member)	MoWS – Engineer I

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## Appendixes

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*Appendix 1: General Layout Map of Itare Dam*

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*Appendix 2: Gazette Notice on Forest Logging*

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*Appendix 3: Pipeline Layout for Chemususu Water Supply Project*

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*Appendix 4: Land Acquisition Layout for Yamo Dam*

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*Appendix 5: Layout Map of Wamba Dam*

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*Appendix 6: Authorization and No Objection Letters from KFS*

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**KENYA**  
Forest Service

Kenya Forest Service  
Karura, Off Kiambu Rd  
P.O. Box 30513-00100  
Nairobi, Kenya

Ref. No. **WATER/1/KFS/115/VOL.X/125**

Date: **7<sup>th</sup> June, 2018**

The Chief Executive Officer  
Northern Water Services Board (NWSB)  
P.O. Box 495-700100  
GARISSA

**CLARIFICATION OF THE MORATORIUM ON LOGGING AS IT RELATES TO  
WAMBA AND YAMO DAM WATER SUPPLY**

Refer to the Principal Secretary letter number DENR/8/2/VOL.II/44 dated 31<sup>ST</sup> May, 2018 on the decisions on the Joint Ministerial meeting held by the Cabinet Secretary (CS) Hon. Keriako Tobiko Ministry of Environment and Forestry and Hon Simon Chelungui Ministry of Water and Sanitation on 13<sup>th</sup> April, 2018 which resolved that project work in the two dams be allowed to continue subject to the following conditions:

1. All payments due and contained in KFS permit letters be paid immediately
2. Northern Water Services Board to conclude acquisition of Special Use License for the two projects from KFS
3. Trees felled from the dam sites to be secured awaiting KFS removal
4. Constructor to establish a roaster to document all entry and exit from the dam sites on daily basis supervised by KFS officers.
5. NWSB to ensure that all mitigation measures contained in NEMA certificates are implemented.
6. All contractors to adhere to working hours within the forest reserves as provided under the law (from 6 a.m. to 6 p.m.)
7. NWSB to submit monthly progress report on project implementation to the two ministries for any follow-up actions.

Trees for better lives

Tel: (254) 020-3754904/5/6, (254) 020-2014663, (254) 020-2020285, Fax: (254) 020-2385374  
Email: info@kenyaforestservice.org Website: www.kenyaforestservice.org

Subject to fulfilment of the above conditions, I now authorize the work at the Wamba and Yamo Dam Water Supply to continue. A copy of this authority letter is forwarded to the Head of Conservancy Ewaso North and Ecosystem Conservator Samburu County to ensure that all the provision stated are fully complied with.

  
Monica N. Kalenda  
**Ag.CHIEF CONSERVATOR OF FORESTS**

**Copy:** Principal Secretary  
Ministry of Environment and Forestry  
P.O. Box 30126-00100  
**NAIROBI**

Head of Conservancy  
Ewaso North  
P.O. Box 141  
**ISIOLO**

Ecosystem Conservator of Forests  
Samburu County  
P.O. Box 110  
**MARALAL**

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*Appendix 7: Joint Ministerial Minutes*

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<b>MINUTES OF THE JOINT MINISTERIAL MEETING ON WATER PROJECTS AFFECTED BY THE MORATORIUM ON LOGGING IN FOREST RESERVES HELD ON 13<sup>TH</sup> APRIL, 2018 AT MAJI HOUSE, NAIROBI</b>	
<b>Present</b>	<p>Hon. Simon Chelungui – CS, MW&amp;S (Chairman), Hon. Keriako Tobiko - CS, ME&amp;F (Co-Chairman)</p> <p>Ms. Winnie Guchu – CAS, MW&amp;S, Mr. Joseph Irungu – PS, MW&amp;S, Mr. Joseph K. Keter – SA, MW&amp;S</p> <p>Eng. S.A.O. Alima- Ag. WS, MW&amp;S, Gideon N Gathaara – Conservation Sec. ME&amp;F, Esau Omollo – SDCCF (Forest), Monica Kaluda– Ag CCF, Eric Nahama – CCF/KFS, Caroline Musasa– CPCO, ME&amp;F</p> <p>A.N. Osman – CEO, NWSB, Eng. Moses Naivasha– CEO, TWSB, Eng. J. Muchiri – GM-TPD</p> <p>Joel N. Onchwati– CFO MW&amp;S, Monica A. Omollo– Head Public Comm, MW&amp;S, Canute Mwakamba – DTCM-WRA, Gladys Wekesa – Ag. D/TW, MW&amp;S, Wilson Tonkei – ME&amp;F</p>
<b>Agenda</b>	Introduction, Opening Remarks, Presentation of the Technical Report, Discussion on the findings and Recommendations
<b>Introduction</b>	The Joint Ministerial Meeting was held as a follow-up to the first one held at the Ministry of Environment and Forestry to discuss on the impact of the Moratorium on the on-going water projects located in Forest Reserves. The meeting started at 3:30pm with a prayer and self-introduction. The Meeting was Co-Chaired by the Cabinet Secretary for Water & Sanitation and the Cabinet Secretary for Environment and Forestry.
<b>Opening Remarks by the Co-Chairs</b>	<p><i>Hon. Simon Chelugui,</i></p> <p>CS welcomed all members and thanked the Cabinet Secretary for Environment and his team for accepting his invitation. He also thanked Maji House team led by CAS &amp; PS, noting that their presence was a proof of the importance of the meeting. He informed the meeting that in order to fulfil the Ministry’s mandate, measures are being put in place to increase water access across the entire nation through construction of water storage dams and water supply networks.</p> <p><i>Hon. Keriako Tobiko</i></p> <p>The CS said he was pleased to be in the meeting, terming it a reciprocating visit to the Ministry of Water and Sanitation. He recalled that the first meeting was held in his Ministry and thanked CS Chelugui for the invitation.</p> <p>He pointed out that in cases where forests have been identified as appropriate sites for infrastructure development, it would be necessary to ensure that all initiatives ensure sustainability of our resources, and by implementing all the mitigation measures. He cautioned against the risk of ending up with so many infrastructural facilities in the forests. He said that the Ministerial engagement was important, but the two Ministries will have to advance it to the next level, like the Cabinet, in order to incorporate all the relevant Ministries and institutions.</p> <p>He reminded the members of the immediate concern, which is the on-going projects that have been affected by the Moratorium and encouraged them to discuss and agree on ways that will address the current concerns.</p>
<b>Topic</b>	<b>Joint Ministerial Technical Team Observations &amp; CS’s Meeting</b>

**MINUTES OF THE JOINT MINISTERIAL MEETING ON WATER PROJECTS AFFECTED BY THE MORATORIUM ON LOGGING IN FOREST RESERVES HELD ON 13<sup>TH</sup> APRIL, 2018 AT MAJI HOUSE, NAIROBI**

	<b>Recommendations</b>	<b>Recommendations and Timelines</b>
<b>Itare Dam Water Supply Project</b>	<ul style="list-style-type: none"> <li>• The dam and treatment plant are located outside the forest boundary and construction works was not affected.</li> <li>• A total of 43.94km pipeline wayleave was affected by the Moratorium</li> <li>• Contractor had worked for 9days on the wayleave section and 6km had been cleared before Moratorium was enforced</li> <li>• Considerations be made to vary the scope of the Moratorium on access to the Forest Reserves and clearing of the wayleaves to allow construction to proceed.</li> </ul>	<ul style="list-style-type: none"> <li>• The project should be allowed to proceed since the work had already started before the Moratorium and RVWSB has fulfilled all KFS requirements.</li> </ul>
<b>Chemususu Water Supply Project</b>	<ul style="list-style-type: none"> <li>• Construction of the new Chemususu Water Treatment Plant was on going.</li> <li>• Community leaders complained that the existing way leave was too wide and opposed to the cutting of some indigenous trees but are in support of the water project.</li> <li>• 8Km pipeline wayleave traversing Chemususu and Narasha Forests was affected by the Moratorium.</li> <li>• Inventory of trees to be removed should be finalized and payments made by RVWSB</li> <li>• Cutting of high value indigenous trees such as Podocarpus spp which had been marked be avoided</li> <li>• Considerations be made to vary the scope of the Moratorium on access to the Forest Reserves and clearing of the wayleaves to allow construction to proceed.</li> </ul>	<ul style="list-style-type: none"> <li>• The Project should be allowed to proceed since the work had already started before the moratorium.</li> <li>• Client has also fulfilled all the requirements to KFS.</li> <li>• A joint inventory should be done and payments to be made by <b>23/4/2018</b></li> <li>• Wayleave to be modified so as to preserve the 14 indigenous trees identified by the community</li> <li>• In accordance with conditions of the permit the nursery and the rangers'</li> </ul>

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		<p>camp should be relocated at the cost of RVWSB. Relocation to start in 7 days and should be provided with water.</p>
<p><b>Wamba Dam Water Supply</b></p>	<ul style="list-style-type: none"> <li>• No objection letter has been issued to Northern Water Services Board.</li> <li>• Process of issuance of special use license be finalized</li> <li>• Inventory of the forest materials to be removed at the dam submerged area is estimated to cost KShs. 1,335,834.70 and has not been paid</li> <li>• Taking cognizance that Dams are intended to serve communities in ASAL area prone to water conflicts and food security, Considerations be made to vary the scope of the Moratorium on access to the Forest Reserves and clearing of the wayleaves to allow construction of the project to proceed.</li> </ul>	<ul style="list-style-type: none"> <li>• The Wamba project should be allowed to proceed since the work had already started before the moratorium.</li> <li>• Client has also fulfilled all the requirements to KFS.</li> <li>• NWSB should arrange to make payment of Kshs. 1.3M for the stock to be felled during construction.</li> </ul>
<p><b>Yamo Dam Water Supply Project</b></p>	<ul style="list-style-type: none"> <li>• No objection letter has been issued to Northern Water Services Board.</li> <li>• Process of issuance of special use license to be finalized.</li> <li>• Inventory of the forest materials that will be lost when the dam area is submerged is estimated to cost Ksh. 19,572,139.10</li> <li>• Taking cognizance that Dams are intended to serve communities in ASAL area prone to water conflicts and food security, Considerations to be made to vary the scope of the Moratorium on access to the Forest Reserves and clearing of the wayleaves to allow construction of the project to proceed.</li> </ul>	<ul style="list-style-type: none"> <li>• Full evaluation report and a copy of the Letter of No Objection should be annexed to the technical report.</li> <li>• Client has also fulfilled all the requirements to KFS.</li> <li>• The Project should be allowed to proceed since the work had already started before the Moratorium.</li> </ul>

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		<ul style="list-style-type: none"> <li>• NWSB should arrange to make payment of Kshs. 19M for the stock to be felled during the construction</li> </ul>
<b>For All the Projects</b>		<ul style="list-style-type: none"> <li>• Felled stocks must be secured at the site to await removal by KFS</li> <li>• A system to be put in place to document those who enter and exit the site on a daily basis. KFS officers to be stationed on site to undertake inspection.</li> <li>• Ensure that all mitigation measures as outlined in the NEMA certificate are implemented</li> <li>• Contractor to adhere to the working hours as provided for in the law (i.e. from 6am to 6pm)</li> <li>• Monthly report submitted to the technical team- PSs-CSs for compliance</li> </ul>
<b>Bosto Dam Water Supply Project</b>	<ul style="list-style-type: none"> <li>• No Objection letter has been issued for dam site 1.</li> <li>• EIA already carried out and the NEMA license issued.</li> <li>• There is urgent need to verify and validate information of KFS report on the ground by visiting the dam site.</li> </ul>	<ul style="list-style-type: none"> <li>• JMTT to visit the site and prepare a comprehensive report and</li> </ul>

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		submit to the two Cabinet Secretaries by <b>19<sup>th</sup> April, 2018</b>
<b>Letter to D.P</b>		The Joint Ministerial Technical Team to prepare <i>a joint communication</i> to H.E. The Deputy President on the recommendation to <i>define the scope of the moratorium</i> , for his concurrence by <b>16<sup>th</sup> April, 2018</b> .
<b>Other Water Projects</b>		The Principal Secretary, Water and Sanitation informed the meeting that the Ministry has compiled another list of projects affected by the moratorium to be considered by JMTT. Application to be made to the Ministry of Environment and Forestry.
<b>Closing Remarks</b>		<ul style="list-style-type: none"> <li>Hon. Keriako Tobiko, thanked the CS Water and Sanitation for hosting the meeting. He commended the Technical Team for their dedication to the task assigned to them with tight timelines.</li> <li>Hon. Simon Chelugui, thanked the CS for Environment and Forestry for his leadership in the discussion with the Technical Team, thus providing the much-needed way forward. He also thanked the Technical Team for the work they had done that led to the outcome of the meeting.</li> </ul>
<b>Adjourn</b>		There being no other business the meeting adjourned at 18.20pm

### 11.3. Members of the Study Team

The following Professional participated in the Study:-

ITEM	NAME	DESIGNATION	INSTITUTION	ROLE PLAYED
1	Eng. Bennard Imbambi Kasabuli	PSE J/G Q	MW&S	Team leader, Lead Expert, Dam Expert
2	Mrs Nancy Koech	Hydrologist 1	MW&S	Hydrologist
3	Mrs Teresia Njeri	Lecturer	Kenya Utalii College	Ecologist
4	Mrs Magadelene Komen	Engineering Assistant	MW&S	Sociologist