REPUBLIC OF KENYA
MINISTRY OF ENVIRONMENT, WATER AND NATURAL RESOURCES

RIFT VALLEY WATER SERVICES BOARD

ITARE DAM WATER SUPPLY PROJECT

Environmental and Social Impact Assessment (ESIA) Study Report

DECEMBER 2015

H.P. GAUFF INGENIEURE GmbH & Co. KG - JBG
Berner Strasse 45
D-60437 Frankfurt am Main
Germany
Tel: +49-69-5 00 08-0
Fax: +49-69-5 00 08-111
E-mail: jbgnai@gauff.com

East Church Road
P.O. Box 49817
00100 Nairobi
Kenya
Tel: +254-20-4445288
Fax: +254-20-4446124

FORM 2 (r.19)

Application Reference No.

FOR OFFICIAL USE

THE ENVIRONMENT MANAGEMENT CO-ORDINATION ACT

SUBMISSION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT REPORT

PART A: DETAILS OF PROPONENT

A1. Name of proponent (Person or Firm): Rift Valley Water Services Board (RVWSB)

A2 PIN No. ……P000642453S…..…….

A3 Address. Maji Plaza, Prisons Road, P.O. Box 2451-20100, Nakuru.

A4 Name of contact person ….Eng. J.K. Mutai……...

A5 Telephone No: of Contact Person ……051 2213557…….……...

A6 Fax No: ……..N/A……..…

A7 E-mail: info@rvwsb.go.ke...……...…….…

PART B: DETAILS OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT REPORT.

B1 Title of the proposed project: Environmental and Social Impact Assessment (ESIA) Project Report for the proposed detailed designs of Itare Dam Water Supply Project.

B2 Objectives and scope of the project: to carry out Environmental and Social Impact Assessment (ESIA) for the proposed detailed designs and subsequent construction of Itare Dam Water Supply Project.

B3 Description of the activities: The Work involved collection, analysis and presentation of all information pertaining to the design of the water supply project as well as baseline social, health and safety, ecological and environmental information. Collection of information included desk studies, study of the engineering design and directed consultation with project affected people and lead agencies. The proposed project was described and all relevant legal framework for which the proposed work would cover, either at design, construction, operation or closure stage explored. The social and environmental impacts likely to emanate at the four stages of the project, whether positive or adverse were projected and explained to detail. A Plan to reduce, minimize or altogether eliminate the adverse impacts was drawn up (ESMMP) detailing the nature and scope of the impact, mitigation or management measures and responsibility for implementation apportioned. A bill of the cost of mitigation was also drawn up. Health and Safety guidelines relevant especially during construction stage were outlined and a schedule for evaluation and monitoring of the effectiveness of mitigation measures proposed prepared (EMP). The conclusions and recommendations pertaining to the study were drawn.

B4 Location of the proposed project: *Nakuru County*

PART C: DECLARATION BY THE PROPONENT

I hereby certify that the particulars given above are correct and true to the best of my knowledge.

Name … **Eng. J.K. Mutai** ……. Designation …**CEO**……Signature……..

On behalf of … **Rift Valley Water Services Board (RVWSB)**……Date…….

(Firm Name and Seal)

PART D: DETAILS OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT EXPERT

Name (Individual/firm)	**Eng. Zablon Isaboke Oonge, Ph. D**
Certificate of registration No.	**0217**
Address	**P.O. Box 68221-00200 Nairobi**
Tel:	**+254-733-750231** Fax: **N/A**
E-mail:	**oongezi@gmail.com**

PART E: OFFICIAL USE

Approved/not approved ……

Comments:

……
……
……
……..

Officer…… Sign …… Date ……

Important Notes: Please submit the following:

(a) Three copies of this form

(b) 5 copies of the project study report and a soft copy

(c) The prescribed fees to:

Director-General,

The National Environment Management Authority,

Kapiti Road, South C,

P.O. Box 47146,

NAIROBI.

Tel. 254-02-609013/27/79 or 608999 Fax. 254-02-608997

DECLARATION

Proponent: Rift Valley Water Services Board

Activity: Environmental and Social Impact Assessment

Report Title: Environmental and Social Impact Assessment for the Itare Dam Water Supply Project

Name and Address of Lead Environmental Expert:

Eng. Zablon Isaboke Oonge, PhD

P.O. Box 68221-00200 City Square

Nairobi.

Tel +254 733 750231

NEMA Registration No:

Lead Environmental Expert: No 0217

Name and Address of Proponent:

Rift Valley Water Services Board

Maji Plaza, Prisons Road

P.O. Box 2451-20100

Nakuru.

Signed: _____Date: **26tn JANUARY 2016**

Eng. Zablon Isaboke Oonge PhD

Lead Environmental Expert

NEMA Reg. No 0217

For: RVWSB

Disclaimer

This Environmental Impact Assessment report is being submitted in accordance with the terms and conditions of Contract in respect of provision of consultancy services for Environmental Impact Assessment Report on the Proposed Itare Dam Water Supply Project. It has been carried out in full observance of the EIA regulations (Kenya Gazette Notice No. 56 of 13 June 2003) in compliance with the Environmental Management and Coordination Act, 1999 and subject to terms and conditions of the National Environment Management Authority (NEMA).

ESIA EXECUTIVE SUMMARY

Background

This report is prepared as a full environmental and social impacts study commissioned by the Client upon acceptance of the terms of reference by the National Environment Management Authority dated September 7th, 2015.

Study Methods

The study approach and methodology adopted included screening and scoping to determine the extent of the project and desktop data search and analysis for the baseline bio-physical and social environmental parameters of the project area. In addition, the consultant worked with the project design group and was briefed and obtained design approaches to be used which informed the requirements of the environmental reporting process and for which excerpts have been obtained on salient design information. The Consultant engaged on multi-faceted public consultation process which included ad hoc roadside interviews, household social and environmental surveys using structured questionnaires duly analysed and key informant interviews to institutions and lead agencies. Based on these findings and expert judgement, the consultant has compiled the projected social and environmental impacts (positive and negative) likely to emanate from proposed project activities and also the Environmental and Social Monitoring and Management Plan (ESMMP) which details how adverse impacts will be reduced or eliminated and by whom.

Legislative Framework for this Study

The principal National legislation governing issues of environmental concern in Kenya is the Environmental Management & Coordination Act of 1999 typically referred to as EMCA calls for Environmental Impact assessment (EIA) (under Section 58) to guide the implementation of environmentally sound decisions and empowers stakeholders to participate in sustainable management of the natural resources. Projects likely to cause environmental impacts require that an environmental impact assessment study to be carried out. It is under this provision that the current study has been undertaken.

Other legislation adhered to during this study are the regulations borne of EMCA 1999 namely the Environmental Impact Assessment and Audit Regulations 2003; The Environmental Management Act, Coordination (Waste Management) Regulations 2006; the Environmental Management Coordination (Water Quality) Regulations 2006; and the Environmental Management and Coordination (Noise and Excessive vibration pollution Control) Regulations2009 (Legal Notice 61), Air quality Regulations 2009 among others.

Sectoral legislation applicable to this Project include The Lands Act (2012), the National Land Commission (2012), the Traffic Act (CAP 403), the Wildlife Act Cap 376, The Public Health Act (CAP. 242), and the Physical Planning Act (Cap 286) among others.

Trans-boundary and International environmental legislation applies especially to donor funded projects and project components for which the country laws do not sufficiently/explicitly address or for which the country laws are deficient. This was highlighted in how the Nile treaties affect the Project.

Expected Impacts

The expected impacts emanate from the Planning phase, the Construction Phase, The Operation phase and the De-commissioning Phase of the project.

Improving water supply coverage in Nakuru Municipality and along the pipeline route will have a wide range of environmental and social implications. In general, successful implementation of the project will have high socioeconomic benefits to the people and will contribute to their health and well-being. Overall, negative expected impacts are related to pipeline and associated infrastructure rehabilitation such as valve chambers, washouts and water storage tanks and replacement and expansion construction works and operations. These impacts are localized and not considered significant and long-lasting and can be mitigated through appropriate mitigation measures. The severity and duration of these impacts can be minimized by ensuring that the excavation and construction works are limited to short working sections, and that works are carried out rapidly and efficiently.

A significant Planning Phase impact is the land-take for construction. This is adverse, long-term and irreversible. Most of the project components require a lot of land be reserved for pipeline wayleave, storage tanks and the dam inundated area. The pipeline will be confined to a 9m reserve. Existing road reserves will be utilised as much as possible. A detailed Resettlement Action Plan has been prepared.

Significant Construction Phase impacts are mainly (and not necessarily in order of priority): construction camps impacts, construction plants installed (concrete & asphalt plants) construction noise, storm water run-off and earthworks impacts. Construction phase impacts envisaged are generally significant in magnitude and socially and environmentally adverse but are also reversible, short-term and largely mitigable. Construction camp impacts include generation and inappropriate disposal of solid and liquid wastes, haphazard exploitation of natural resources in the surrounding areas e.g. trees for firewood, increased spread of Sexually Transmitted Diseases (STD) and HIV/AIDs and change of cultural norms from migrant workers. Construction work impacts include noise, dust, disruption of services like water supply, electricity supply and disruption of storm water facilities. Other detrimental construction phase impacts derive from extraction of materials in borrow and quarry sites and their subsequent haulage and stockpiling. Positive construction phase impacts include economic boost from injected construction money which is spent in the local environment for purchasing food and other supplies, rental accommodation and local travel. Also, there will be opportunity for skills transfer and skills acquisition.

Operation phase impacts will largely be positive benefits accruing from operation of improved water supply and sanitation. These include less water-borne disease, reduced water costs and therefore reduced cost of living, improved access to water, improved comfort and regional prosperity. There will be overall improved quality of life due to multiplier benefits of improved service delivery. However, significant adverse impacts from operations include solid waste disposal from the facilities, increased risk of HIV/AIDS and STD infections since a development of an area inevitably comes with vices from migrant community.

De-commissioning of the Project is not envisaged. Project components however will be rehabilitated over time having served their useful life.

Environmental & Social Mitigation and management Plan (ESMMP)

This was prepared to reduce, minimize or altogether eliminate the adverse impacts. Positive impacts are project enhancements and do not require mitigation.

Impact Area	Source/ Impact	Mitigation Measures	Responsibility
Noise & Vibrations	▪ Plant and Construction Noise at dam site, quarries, borrow areas, pipeline alignment and tunnel site. ▪ Vibrations where blasting operations will be required including Quarry operations, Shaft sinking in tunneling, bridge piles ▪ Tunneling through either D&B or TBM methods ▪ Demolitions by implosion	▪ Fit plant with noise mufflers where possible ▪ Positioning Powered Mechanical Equipment (PME) so that noise is directed away from sensitive areas ▪ Contractor to agree noise limits/ noise control stations with NEMA and obtain a Construction Noise Permit prior to the commencement of construction work ▪ PPE for workforce ▪ Continually monitor complaints from affected communities who are the noise receptors	▪ Contractor ▪ Supervising Engineer
Air quality	▪ Dust from haulage and stockpiling of borrow material, earthworks and mixing plants ▪ Emissions from construction equipment	▪ All dust emissions to be water-sprayed on dry and windy days as many times as will be required ▪ Contractor to provide Respiratory Protective Equipment (RPE) like helmets and dust masks to the	▪ Contractor ▪ Supervising Engineer

		construction crew and keep accurate records of their issue as well as staff turn-over Spoil stockpiles to be lightly compacted after placement and to be placed in areas protected from the wind ▪ Regulate working hours and avoid night time construction if possible	
Water Resources Management	▪ Potential sources of water pollution include site runoff and drainage from construction activities in the sites, effluent from general construction activities and sewage effluent from the construction workforce. ▪ Storm water discharge and flow re-direction with its attendant impacts such as flooding privately owned land, inundation of farms with growing crops, ▪ Excess pressure on scarce water resources especially in the drier	▪ Restore to original once project winds up ▪ Storing oils and fuels in designated areas which have pollution prevention facilities; ▪ Using solid-fabric waterproof materials to cover all stockpile areas during rainstorms; ▪ Collecting construction phase discharge in a temporary drainage system and then treating or desilting it on-site before discharging it to storm water drains or river	▪ Contractor

	areas such as the Rift Valley sections with inland drainage ▪ Blockage of drainage ways along the pipeline alignment	▪ Cleaning all vehicles and plant before leaving a construction site ▪ Stabilize bed and banks of streams as immediately after construction; ▪ As far as possible construct stream crossings in the dry season; ▪ Restore drainage patterns as closely as possible post construction; ▪ Minimize any filling, draining, damming or alteration of waterways; especially along pipeline route ▪ Obtain construction water from existing allocations where possible	
Waste Management	▪ Vegetation clearing and transportation, ▪ Typical construction wastes including packaging, surplus construction materials such as timber, concrete, gravel, metals and plastics,	▪ Enforce littering by-laws ▪ Hygiene, Environmental education and awareness to members of the public to alleviate ignorance ▪ • Ensure garbage is removed by an appropriate licensed contractor;	▪ Public Health Office ▪ Local authorities

Finally, the preliminary ESIA study has found numerous impacts, none of which is unmitigable. There is only additional cost of mitigation to the overall project cost.

	▪ Surplus spoil from earthworks and drainage construction, ▪ Electrical and telecommunications cabling off-cuts, and ▪ Typical domestic waste - to be generated from occupation of accommodation villages. ▪ Demolition wastes ▪ Decommissioned furniture ▪ Chemical waste from the maintenance of construction plant and equipment ▪ Abandoned construction materials such as ballast	▪ Transport any surplus spoil that cannot be re-used off-site to an approved landfill site or to borrow pits; ▪ Provide recycling bins around accommodation villages, site offices and amenities; ▪ Store all chemicals, used oils, oily rags, solvents, lubricants and fuel in covered and banded areas; ▪ Ensure used furniture and equipment from decommissioning is sold/re-used or disposed of at an appropriately licensed landfill;	
Terrestrial Ecology	▪ Removal of top soil, excavation and mass haulage will expose the land to elements of erosion such as wind and water and thus will trigger the process of land degradation ▪ Environmental impacts associated with clearing include: removal of	▪ Contractor to Develop and implement an erosion and Sediment Control Plan ▪ Restrict the extent of clearing to the minimal amount necessary particularly in locations containing endangered plant and animal species;	▪

	trees, shrubs and wildlife habitat, changes to soil water, temperature and fertility in adjacent areas, erosion and fire hazards due to slash stockpiling	▪ Where possible locate all construction facilities such as equipment storage, offices and accommodation villages within already cleared areas; ▪ By transplanting significant species as a means of conservation where it is not possible to avoid felling, translocate to a suitable site elsewhere; ▪ Work with forest agency, CBOs to do reforestation within project area to compensate for trees felled during construction	
Aquatic Ecology	▪ Habitat alteration and fragmentation of forested habitat; ▪ Loss of nesting sites and other wildlife habitat through bush clearing; ▪ Disruption of watercourses; ▪ Establishment of non-native invasive plant species;	▪ Ensure all construction machinery and materials bought onto site are weed, seed and mud free and have undergone a thorough inspection; ▪ • Rehabilitate disturbed ground surfaces as soon as practical; ▪ • Avoid fragmentation of aquatic habitats;	▪

	▪ Creation of barriers to wildlife movement; ▪ Visual and auditory disturbance due to the presence of machinery, construction workers, and associated equipment. ▪ Sediment and erosion from construction and storm water runoff may increase turbidity of surface waters	▪ • Collecting construction phase discharge in a temporary drainage system and then treating or desilting it on-site before discharging it to storm water drains or river ▪ Contractor to Develop and implement an erosion and Sediment Control Plan	
Land management	▪ Land take ▪ Creation of stagnant water bodies in borrow pits and quarries which act as habitats for disease vectors	▪ Detailed RAP ▪ Contractor to liaise with NEMA and identify if independent EIA work is required ▪ Obtain approval for final quarry reinstatement from NEMA and County environment committee	▪ RVWSB ▪ contractor
Services Delivery Impacts	▪ The mandate of the following bodies to deliver respective services in their areas of jurisdiction may possibly be compromised	▪ Inform affected parties well in advance of intention to disrupt services ▪ Work with services providers to ensure speedy restoration of services	▪ Contractor ▪ Supervising Engineer

	during the planning and implementation. ▪ Kenya Power ▪ Water Services Providers ▪ Roads Authorities (KeNHA, KURA, KeRRA) ▪ Kenya Pipeline ▪ Fiber Optic Networks such as KDN ▪ Delays caused by construction traffic using local roads		
Cultural Heritage	▪ Spread of HIV/AIDS & STIS	▪ As much as practical, hire labour locally ▪ Social education to promote peaceful co-existence	▪ Political Leadership, ▪ Provincial administration ▪ Contractor
EHS	▪ Creation of stagnant water bodies in borrow pits and quarries which act as habitats for disease vectors ▪ Spread of HIV/AIDS & STIS	▪ Establish precautions to avoid accidental spills ▪ First Aid kits to be provided at strategic locations ▪ Record of accident occurrences to be available at all times	▪

		▪ Construction crew to be provided with PPE at all times ▪ Workers to be trained in Occupational Safety and Health (OSHA) Procedures and manuals to be available at all times	
Dam	▪ Drowning accidents in reservoir	▪ Secure area with appropriate fence to restrict unauthorized access and therefore guard against accidents	▪
Access Roads	▪ Traffic accidents ▪ Land take ▪ Dust ▪ Construction wastes ▪ Erosion & Sediment hazard from Storm water run-off	▪ Erect signage and speed controls ▪ Detailed RAP ▪ Sprinkle water during construction and control speeds during operations ▪ Dispose of wastes responsibly ▪ Design storm water drains to discharge away from peoples farms and salient water springs serving communities	▪
Power generation	▪ Fire hazards ▪ Oil spills ▪ Occupational hazards	▪	▪

Water Treatment Plant	▪ Land use changes from purely agricultural to mixed use of industrial and residential ▪ Water treatment chemicals ▪ Solid waste disposal	▪	▪
Pipeline	▪ Visual intrusion ▪ Pipe bursts ▪ Construction wastes ▪ Noise and vibrations ▪ Clearing of vegetation	▪ Restore ground to original conditions ▪ Adoption of good housekeeping practices, sorting and segregation of wastes for reuse and disposal	▪ Design Engineer
Tunnel	▪ Production of respirable dust ▪ Settlement or failure of tunnel support leading to the formation of a surface crater, utilities & change of surface hydrology ▪ Removal of spoil materials may lead to odour impacts ▪ Potential loss of groundwater ▪ Localized lowering of the water table	▪ RVWSB to set overall EHS strategy for the tunnel projects ▪ Encourage early contractor involvement ▪ Contractor to train workforce on in Tunnelling EHS ▪ Use Respiratory Protective Equipment (RPE) ▪ Use equipment fitted with water suppression to minimize the amount of dust	▪

	▪ Suspended solids in effluents generated from dewatering ▪ Process water that requires treatment. ▪ Sewage generated by the construction workforce, ▪ Oily runoff from vehicles and storage areas ▪ Construction waste generation ▪ Contaminated soil from container storage or vehicle repair sites ▪ Visual impacts ▪ Loss /alteration of habitat ▪ Construction noise on sensitive receptors. ▪ Possible fire tragedies	▪ Locate noisy machinery away from sensitive receivers; use silencers, mufflers and acoustic shields on plant ▪ Installation of appropriate drainage facilities to control site runoff, (silt and oil traps) ▪ Biological treatment or other polishing facilities to ensure sewage effluent meets regulatory discharge criteria ▪ Adoption of good housekeeping practices, sorting and segregation of wastes for reuse and disposal ▪ Upon the completion of construction, reinstatement of visually amenable features and re-vegetation will be implemented ▪ Install fire detection and fire fighting facilities ▪ Design alternative escape route for tunnel workers	

		▪ Tunnel system design to ensure adequate ventilation	
Reservoirs	▪ Visual impact on landscape ▪ Intrusion by vandals targeting fittings. ▪ Construction noise on sensitive receptors.	▪ Restore ground to original conditions ▪ Inspect and repair all enclosure fences	▪ Contractor ▪ Supervising Engineer

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1 INTRODUCTION

1.1 Purpose and Structure

The Itare Dam Water Supply Project project is aimed at augmenting water supply in the Nakuru Municipality and its environs; Molo, Elburgon, Salgaa and Njoro towns. Nakuru's water supply system is operated by the Nakuru Water and Sanitation Services Company (NAWASSCO) while Molo, Elburgon, Salgaa and Njoro towns are operated by the Nakuru Rural Water and Sanitation Company (NARUWASCO).

The project is based on the Engineering Design and Preparation of Tender Documents for Itare Dam Water Supply Project (herein referred to as "the Project") proposed by Rift Valley Water Services Board (RVWSB) (the Proponent)

It consists of a 57m high Asphalt Core Rockfill Dam whose top elevation is 2420 masl, a 1.8 km long raw water mains, a 105,000m^3 daily capacity water treatment plant, 110km long bulk transmission pipelines for treated water transmission from Kuresoi to Nakuru through Chepsir, Kedowa and Salgaa, with branch lines to Molo, Elburgon and Njoro, bulk water distribution pipelines and 5No. bulk clean water storage reservoirs in in Nakuru Town. It also comprises a 14.5km tunnel to ensure that conveyance throughout the pipeline is by gravity, a power generation component to run the proposed water treatment plant and development of an access road to the dam site.

An Environmental and Social Impact Assessment is necessary in order to develop an executable Environmental and Social Management Plan (ESMP) for project implementation. The ESMP will detail the measures to be adopted, the persons responsible, expected timeframe and cost estimates to address identified adverse impacts during the planning, construction, operation and decommissioning phases of the project.

1.2 The Proponent

The Water Act 2002 provided the Government of Kenya with an enabling legal and institutional framework for the implementation of fundamental water sector reform. The leading Ministry of Environment, Water and Natural resources - MEWNR (formerly Ministry of Water and Irrigation and Ministry of Water Resources Management and Development) prepared a National Water Services Strategy and a National Water Resources Management Strategy for strategic guidance. An inter-ministerial Water Sector Reform Steering Committee was established to steer the reform process which is implemented through a Water Sector Reform Secretariat.

Principal components of this sector framework consist of a Water Services Regulatory Board (WASREB) to provide for and supervise sector rules and regulations and govern the licensing regime, and eight Water Services Boards throughout the country, to be responsible for the efficient and economic provision of water and sanitation services in their respective areas. Amongst them is the Rift Valley Water Services Board (RVWSB).

The Rift Valley Water Services Board (RVWSB) is one of the eight Water Services Boards (WSBs) created under the Water Act 2002. The Board's main responsibility is the provision of efficient and economical water and sanitation services to the people of the Rift Valley region. There are more than ten Water Service Providers (WSPs) under the Board serving the various areas within the jurisdiction of RVWSB.

1.3 Objectives of the ESIA

The objective of the assignment is to carry out Environmental and Social Impact Assessment (ESIA) study for the proposed dam and all associated works within the scope of works.

The chief goal of the ESIA study will be to ensure that Rift Valley Water Services Board (RVWSB)'s activities on the proposed project do not adversely impact the environment but rather are socially, environmentally and economically sustainable.

The Study will provide RVWSB with an opportunity for necessary leverage of resources in a way that promotes healthy and sustainable environment.

The study specific objectives are:

a) To carry out social-economic surveys among the local communities
b) To identify and characterize the potential environmental, cultural and social impacts of the project roads.
c) To analyse and evaluate the anticipated impacts of the proposed rehabilitation of the project roads on the physical, biological, social-cultural and social economic environment
d) To evaluate the project design proposed and consider its effects on safety, comfort and convenience of the users.
e) To propose measures for mitigating potential adverse impacts of the proposed roads project
f) To assess compliance with environmental laws, regulations and standards.
g) Develop Environmental and Social Management Plan.

h) Develop Environmental and Social Monitoring Plan.

1.4 TOR for ESIA Study

Legal Notice No. 101, The Environmental (Impact, Audit and Strategic Assessment) Regulations, 2009, Part II - The Project Report stipulates as follows:-

In preparation of a project report,

7. (1) every project proponent undertaking a project listed in category II of the second schedule of the Act shall prepare a project report stating -

a) The nature of the project;
b) The location of the project including the physical area that may be affected by the project's activities;
c) The activities that shall be undertaken during the project construction, operation and decommissioning phases;
d) The design of the project;
e) The materials to be used, products and by-products, including waste to be generated by the project and the methods of their disposal;
f) The potential environmental impacts of the project and the mitigation measures to be taken during and after implementation of the project;
g) An action plan for the prevention and management of possible accidents during the project cycle;
h) A plan to ensure the health and safety of the workers and neighboring communities;
i) The economic and socio-cultural impacts to the local community and the nation in general;
j) A plan to ensure the relocation or resettlement of persons affected by the project;
k) An environmental management plan;
l) The project budget; and
m) Any other information the Authority may require.

(2) In preparing a project report, the proponent shall hold at least one public meeting with the affected parties and communities to explain the project, its social, economic and environmental impacts, and to receive oral or written comments and objections to the proposed project;

(3) A project proponent shall send a meeting notice to all the affected parties and communities at least 14 days before the meeting informing them of the time venue and purpose of the for the meeting.

(4) In preparing a project report under this regulation, the proponent shall pay particular attention to the issues specified in the Second Schedule to these Regulations.

(5) A project report shall be prepared by an environmental impact assessment expert registered as such under these Regulations.

(6) Every project proponent undertaking a project of the nature specified in category III of the second schedule shall submit a project brief.

8. A proponent shall submit at least two copies of the project report to the Authority or the Authority's appointed agent in the prescribed form accompanied by the prescribed fees.

9. (1) Where the project report conforms to the requirements of Regulation 7 the Authority shall within seven days upon receipt of the project report, submit a copy of the project report to -

(a) each of the relevant lead agencies;
(b) the relevant District Environment Committee; and
(c) where more than one district is involved, to the relevant Provincial

Environment Committee, for their written comments which shall be submitted to the Authority within twenty one days from the date of receipt of the project report from the Authority.

(2) On receipt of the comments referred to in subparagraph (1) or where no comments have been received by the end of the period of thirty days from the date of receipt of the project report, the Authority shall proceed to determine the project report.
10. (l) On determination of the project report, the decision of the Authority, together with the reasons thereof, shall be communicated to the proponent within forty-five days of the submission of the project report.

(2) Where the Authority is satisfied that the project will have no significant impact on the environment, or that the project report discloses sufficient mitigation measures, the Authority may issue a license in Form 3 set out in the First Schedule to these Regulations.

(3) If the Authority finds that the project will have a significant impact on the environment, and the project report discloses no sufficient mitigation measures, the Authority shall require that the proponent undertake an environmental impact assessment study in accordance with these Regulations.

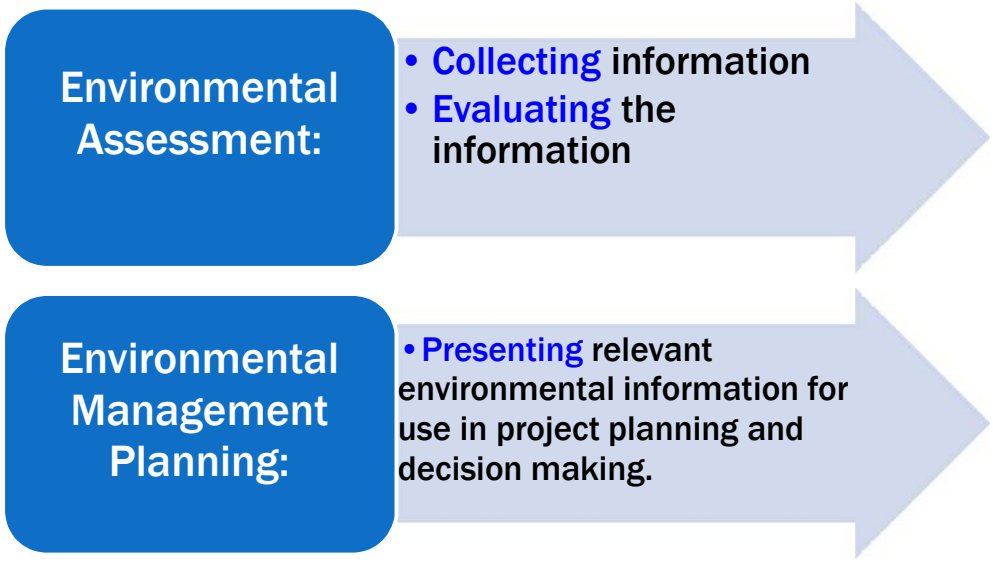
(4) A proponent, who is dissatisfied with the Authority's decision that an environmental impact assessment study is required, may within fourteen days of the Authority's decision appeal against the decision to the Tribunal in accordance with Regulation 46.

1.5 Approach to the Assignment

The approach to this assignment is two-fold

- ✓ Environmental Assessment and
- ✓ Environmental management planning

This is graphically presented as follows:



1.6 Methodology for ESIA

1.6.1 Information collection and evaluation

a) Field Reconnaissance & scoping

The study team visited the project area and explored the baseline environment as well as possible environmental and social impacts as a result of installation of the various project component, i.e.

- ✓ Dam area
- ✓ The proposed treatment works site
- ✓ The proposed access road
- ✓ Proposed bulk transmission and distribution Pipelines
- ✓ Clean Water storage reservoirs
- ✓ Tunnel site

b) Desk Studies

Gathered baseline/background data on chosen dam site and pipeline route alignments such as noise levels, air quality, water and ground water quality, aesthetic quality, etc. and legal framework that establishes the environmental value, protection and monitoring criteria for chosen data.

c) Design Review

Reviewed the Expected Project Actions from Design team members i.e. the embankment & inundation, alignment, geotechnical, hydrology, social, and other such findings.

d) Impact forecasting

Impact forecasting and proposal for minimization, mitigation, remedy and control strategies – Insights have been woven from multiple sources — survey, researched EIA's of similar projects from within and other countries, expert opinion, executive interviews, and personal experience — into a coherent and executable actions during design, construction or operation.

e) Stakeholders Interviews

Stakeholders Interviews, Field Data and Information Gathering through Key Informant Interviews (KII) of experts and lead agency representatives, Focus Group Discussions (FGD) with members of similar interest groups e.g. farmers and Household Surveys (HHS) in sample affected communities.

f) Public/stakeholders' Consultations

Public/stakeholders' Consultations – through one on one meetings with PAPs

g) Study compilation and Consolidation

Application of Information and Data Collected in Impact Assessment in Study compilation and Consolidation

1.6.2 Methodology for Presentation of Information

This will comprise of mitigation measures for the adverse environmental impacts presented in a table format. The Environmental Mitigation & Management Plan (EMMP) will be presented in columns of Potential Impact, Proposed Mitigation, Time Frame, and Party Responsible & Cost of Mitigation.

1.6.3 Reporting

Findings of the ESIA study will be compiled in a project report and submitted to NEMA for review on compliance and completeness.

2 THE PROJECT

2.1 Nature of the Project

Itare Dam is one of the flagship projects that have been identified by the Government of Kenya under Vision 2013. Further, in accordance with the policy of prioritizing development of sources that are most economic, the National Water Master Plan identified that Itare Dam Water Supply Project ought to be developed as a priority. Through a Feasibility Study done in 1998, the proposed Itare Dam site was identified as the most viable long term source of water to address water shortages in Nakuru Municipality, Molo and Rongai areas. This site was chosen because it is located in an area of greater water resources which can be developed to meet the ultimate demand. The dam will have a capacity to yield 100,000m^3/day.

2.2 Location of the Project

This section describes the location of the project including the physical area that may be affected by the project's activities. The Map in Figure 2-1 shows the general location and components traversed by the project.

This assignment mainly targets water supply to the towns of Nakuru County. The Itare dam site is located in Kuresoi Constituency, Kuresoi District and will affect people in Kiptororo and Tinet locations. From there a bulk supply pipeline will traverse Kuresoi, Molo and Nakuru Districts to terminate at a proposed reservoir in Ngata area within Nakuru District. The pipeline will have provisions for water supply off-takes and therefore benefit the towns of Molo, Elburgon, Salgaa and Njoro. En-route the pipeline will also traverse Chepsir, Chepseon, and Kedowa townships.

2.2.1 Nakuru

Nakuru is located on the floor of the Great Rift Valley just south of the equator, approximately 160 km from Nairobi. The town is strategically positioned to serve its hinterland as it is centrally located with developed transport corridors to other centres. In addition the town has a relatively well developed urban infrastructure which has enabled it to effectively play a major role in the region. Lake Nakuru, a RAMSAR site and a wetland of international importance, is located within the Nakuru Municipality. At Nakuru, the Rift Valley floor is approximately 40 km wide. Locally, the town is sandwiched between the scenic Menengai Crater to the north and the Lake Nakuru National Park to the south.

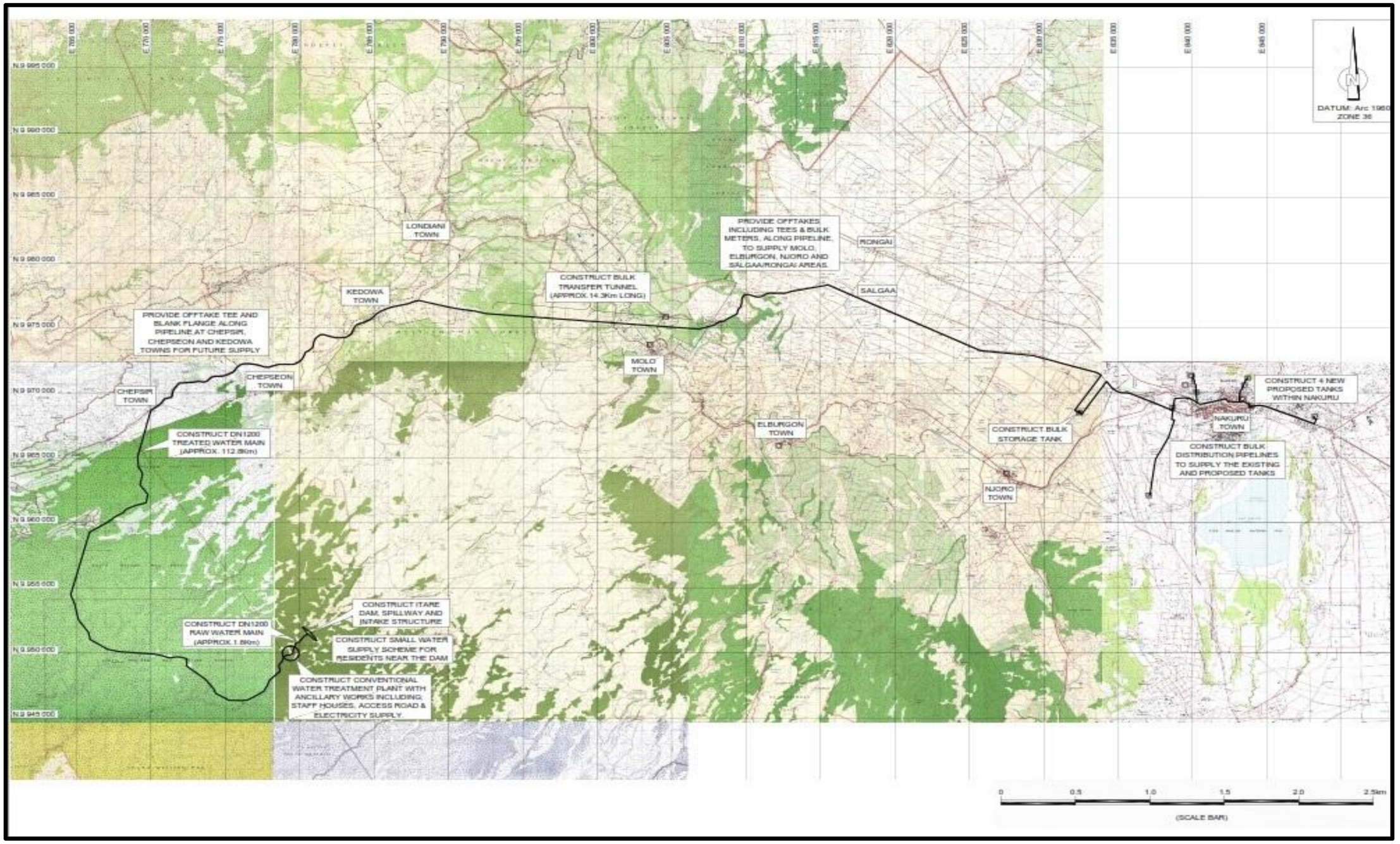


Figure 2-1: General Location Map Traversed by the Project showing the various Proposed Components

According to the 2009 population census, Nakuru District is approximately 1,495.3 km2 with a density of 317 persons per sq. km. Its attractive climate and central location (along the Kenya-Uganda railway and the Trans-African Highway and within the fertile agricultural hinterland) are some of the significant factors that have influenced the town's growth. There has been a tremendous increase in its population over the past three decades. This has led to an increase in demand for basic services and infrastructure such as housing, water and sanitation, roads, among many others. This in turn has put a strain on the available resources, and increased challenges to the Municipal Council to meet the needs of the town's inhabitants.

2.2.2 Molo

Molo District was previously part of the sixteen administrative Divisions of Nakuru District, before it was upgraded to District Level, with Molo town being its district headquarters. It is located at longitude 350 44'S and latitude 00 15' E. According to the 2009 population census, Molo District is approximately 2371.9 km^2 with a density of 229 persons per sq. km.

Molo town has developed mainly due to its strong agricultural background dating back to the colonial times. The main development of the town has taken place along the Molo -Elburgon and Molo - Londiani Roads, approximately 50 km from Nakuru. Elburgon town is located in Elburgon Division within Molo District at longitude 350 49'S and latitude 00 18'E. The town is situated at the edge of Eastern Mau Forest. Elburgon is a small town which has mainly developed along the main Molo-Njoro Road. It is approximately 17 km from Njoro town.

2.2.3 Elburgon

Elburgon town is situated on higher slopes of Rongai Plains at the edges of the eastern Mau Forest. The general topography of the area is characterized by forested Mau Hills with undulating valleys and ridges. The town is located in a valley at an elevation of 2,423 m asl with the main Njoro - Molo road traversing through.

2.2.4 Njoro

Njoro town is located in Njoro Division within Molo District at longitude 350 56' E and latitude 00 19'S. It is nearly 23 km from Nakuru and covers an area of 8.5 km^2. The town is situated on the Eastern Mau slopes from where River Njoro emerges. River Njoro is the main tributary of Lake Nakuru.

Njoro is a small town which has developed mainly due to its agricultural background and close proximity to Egerton University. Financially, the residential potential of the town has increased due to availability of affordable accommodation compared to

Nakuru. The present development trends in the township are primarily along the Nakuru - Njoro -Elburgon Road which traverses the town. Njoro is situated within the Rift Valley floor on the extended south-western slope of the Menengai Crater. The area lies at 2160 masl.

2.2.5 Rongai/ Salgaa

Salgaa is a market in Rongai and lies about 30 km west of Nakuru, along the A104 Road (Nakuru - Eldoret road). It is about 10 kilometres north of Elburgon and 15 kilometres east of Molo.

2.3 Project Alternatives

2.3.1 Do Nothing Alternative

This alternative is not available for the proposed Itare Dam Water Supply Project. The project has been identified as a prime source of water for the fastest growing Nakuru town and has no alternatives.

The do nothing alternative in respect to the proposed Project implies that the status quo is maintained and nothing can be done on the Project. It also implies that meeting water demand needs for Nakuru town in line with Vision 2030 will not be realized for a town expected to play a big role in the most ambitious development blueprint of this country.

Even from an environmental and socio-economic perspective the do nothing alternative is not a suitable alternative for the affected community and Kenya as a whole.

2.3.2 The Project Siting

a) Assessment of Suitable Dam Site

The current site as chosen remains as justified by the report “Nakuru Water and Sanitation Study Full Technical and Long Term Water Supply Source Report, Volume 1 – Main Report (1998)”. The location of the dam at present was the best among options considered at the pre-feasibility study done in 1998 and hence no other alternatives were considered at this stage.

b) Assessment of Suitable Pipeline Routes

The bulk supply pipelines comprise:

- ✓ Raw water pipeline and appurtenances
- ✓ Treated water pipelines and appurtenances including a tunnel

Tentative pipeline routes were initially selected using a Digital Elevation Model (DEM) obtained from satellite imagery maps which compares well with the 1:50,000

topographical survey map contours. This was followed by detailed topographical surveys of the selected routes. The layout plans of the different proposed alignments are included in Appendices.

c) Assessment of Suitable Raw Water Pipeline Route

The raw water pipeline is required to carry raw water from the off-take structure at the dam reservoir to the treatment works nearly 2 km downstream of the dam. The only feasible route which permits water to flow by gravity is by laying the pipeline through dense bush land along a route that follows the Itare River valley to the treatment works location. The proposed route is similar to the route proposed in the MIBP 1998 report.

d) Assessment of Suitable Treated Water Pipeline Route

The treated water pipeline will transmit water by gravity from the clear water tank at the dam site treatment works to the proposed Ngata reservoir site in Nakuru. Route selection was done based on the shortest hydraulically suitable route between the treatment works and the Ngata reservoir. Part of the conduit will have to be laid within a tunnel through the Mau Escarpment at a saddle between Molo and Londiani towns.

In the MIBP 1998 report on the Itare dam project, the chosen route for the pipeline follows the topography from the treatment works along the south western face of the Mau Escarpment for approximately 35 km through forested land. The pipeline will be laid south of the Londiani- Kipkelion -Kericho road across farmland for a length of 16 km. At the Mau Escarpment the pipeline would enter a transfer tunnel where the water will be transmitted through the 14.5 km tunnel after which it will discharge into a header tank. From there the pipeline will be laid across farmland for 25.3 km to Njoro Township where it will follow the Njoro-Nakuru road for 5.8 km up to the proposed Ngata reservoir. The total length of the gravity route would be 105.8 km of which approximately 14.5 km is a tunnel.

Different options for the treated water pipeline route were considered. The four pipeline options considered are discussed below.

1. *Alternative 1A*

For Alternative 1A it is proposed to lay the treated water main from the treatment works where the pipeline would follow a hydraulically suitable route through the forested areas to meet the Londiani-Kericho road (B1 road) at Chepsir town. The pipeline follows the tarmac road passing through Chepseon, and Kedowa towns where it leaves the road towards the Mau Escarpment. It was further established that these towns are within Kericho area and therefore under jurisdiction of Lake Victoria South Water Board-LVSWB. However, in the event future supply is envisaged to Chepsir,

Chepseon, and Kedowa towns provision for off-takes would be provided to avoid future conflicts. At the Mau Escarpment the pipeline would be laid through a 14.3 km tunnel. From the tunnel end the pipeline will be laid across farmland and wherever possible rural road alignments to Njoro town where it will follow the Njoro-Nakuru road terminating at the proposed reservoir at Ngata.

2. *Alternative 1B*

   For Alternative 1B it is proposed to lay the pipeline from the treatment works to follow forested areas along the district boundary between Kuresoi and Kericho up to the Mau Escarpment. In order to avoid future conflicts the pipeline route does not pass through Chepsir, Chepseon, and Kedowa towns which will not be supplied with water from the project. These towns are within Kericho area and therefore under jurisdiction of Lake Victoria South Water Board-LVSWB. The transmission pipeline route in this section is restricted towards the Kericho- Kuresoi boundary which is in a forested area next to the tarmac road. Thereafter the pipeline route cuts across the Mau Escarpment via a proposed tunnel and follows a similar route to Alternative 1A to Ngata reservoir via the Njoro road.

3. *Alternative 1C*

   For Alternative 1C it is proposed to lay the pipeline from the treatment works to follow forested areas along the Kuresoi- Kericho District boundary up to the Mau Escarpment. In order to avoid future conflicts this route does not pass through Chepsir, Chepseon, and Kedowa towns which will not be supplied with water from the dam. These towns are within Kericho area and therefore under jurisdiction of Lake Victoria South Water Board-LVSWB. At the Mau Escarpment the pipeline would be laid through a 14.3 km tunnel. From the tunnel end the pipeline will pass through a dense bush area near Molo River to meet the A104 road at a hydraulically suitable location at Sachang'wan. The pipeline will follow the road passing through Salgaa market and continue up to Ngata where it will divert from the main road to terminate at the proposed Ngata reservoir.

4. *Alternative 1D*

   For Alternative 1D it is proposed to lay the treated water main from the treatment works where the pipeline would follow a hydraulically suitable route through the forested areas to meet the Londiani-Kericho Road (B1 road) at Chepsir town. The pipeline follows the tarmac road passing through Chepseon, and Kedowa towns where it leaves the road after Kedowa Township towards the Mau Escarpment. Although these towns

are within Kericho area and therefore under jurisdiction of Lake Victoria South Water Board-LVSWB, in the event future supply is envisaged to Chepsir, Chepseon and Kedowa townships provision for off-takes would be provided to avoid future conflicts. At the Mau Escarpment the pipeline would be laid through a 14.3 km tunnel. From the tunnel end the pipeline will pass through a dense bushy area near Molo River to meet the A104 road at a hydraulically suitable location at Sachang'wan. The pipeline will follow the road passing through Salgaa market and continue up to Ngata where it will divert from the main road to terminate at the proposed Ngata reservoir.

Table 2-1: Comparison of Alternative Routes for Treated Water Pipeline

Description	**Alternative 1A& 1D**	**Alternative 1B& 1C**
Alignment	Pipeline passes through Chepsir, Chepseon, and Kedowa towns: • On tarmac road therefore accessible during construction • No maintenance cost for the Londiani-Kericho road during operation of the pipeline since it is under the roads authority • Minimal social conflict and environmental degradation. • Provision for off-take tees to supply these towns has been provided in case future supply is unavoidable. • This will avoid future conflict but reduce the supply to Nakuru and the principal en-route towns targeted by the project.	Pipeline passes through forested areas and avoids Chepsir, Chepseon, and Kedowa towns: • Additional costs incurred to construct access roads during construction as road maintenance costs during operation • Increased environmental degradation of the forested areas as well as additional environmental mitigation costs will be required • Additional costs to acquire pipeline wayleave from farmers will be required along the Chepsir-Londiani section • Additional costs to acquire pipeline wayleave along the forested areas • Additional construction costs along the forested section due to pipeline clearance of forested areas.
Description	**Alternative 1A**	**Alternative 1B**
Length	Nearly 111 km	Nearly 110 km
Maximum Static Pressures	Nearly 20 bars	Nearly 20 bars
Compensation	• Second highest no. of affected people is anticipated along this route. • Compensation will be required along: • Forest land – WTP to Chepsir township • Farm land – From tunnel end up to Njoro town	• Highest no. of affected people is anticipated along this route. Compensation will be required along: • Forest land – WTP to tunnel start • Farm land – From tunnel end up to Njoro town
Off-take points	• Provision to supply the 4 towns will be made along the pipeline. One off-take will provided to supply at Molo and Elburgon • town at the tunnel end and another off take to supply Salgaa along the pipeline at a suitable location. The last off-take will be provided along the pipeline at Njoro to supply the town. • Off-take tee will also be provided at Chepsir, Kedowa and Chepseon towns for envisaged future supply to these towns	• Provision to supply the 4 towns will be made along the pipeline. One off-take will provided to supply at Molo and Elburgon town at the tunnel end and another off-take to supply • Salgaa along the pipeline at a suitable location. The last off-take will be provided along the pipeline at Njoro to supply the town. •
Description	**Alternative 1C**	**Alternative 1D- Proposed**

Length	Alternative 1C = 111 km	Alternative 1D = 113 km
Compensation	• No. of people affected is lower than for Alternative 1A & 1B. Compensation will be required along: • Forest land – WTP to tunnel • Few people after diverting from the A104 to the Ngata tank.	• Least no. of people affected. Compensation will be required along: • Forest land – WTP to Chepsir town • Few people from tunnel end to reach A104 road
Off-take points	• Provision to supply the 4 towns will be made along the pipeline. An off-take will be provided at Molo to supply Molo and Elburgon town and another one along the pipeline to supply Salgaa along the way. • Njoro town will be supplied from Ngata reservoir.	• Provision to supply the 4 towns will be made along the pipeline. An off-take will be provided at Molo to supply Molo and Elburgon town and another one along the pipeline to supply Salgaa along the way. • Njoro town will be supplied from Ngata reservoir. • Off-take tee will also be provided at Chepsir, Kedowa and Chepseon towns for envisaged • future supply

Thus route 1D was most favored especially on environmental and socio-economic grounds.

2.3.3 Design Alternatives

The Consultants explored the most economical design to arrive at the choices settled on for various components. Various alternatives were considered during feasibility studies as detailed in the 2012 Feasibility Study. The following Table 2-2 summarizes the alternatives considered; the selected ones are in bold type.

Table 2-2: Summary of the Design Alternatives Considered

Project Component	Alternative Considered (Selected alternative in Bold type)
Water Source Dam type	• Roller compacted concrete dam • Earth fill dam • **Rock fill asphalt concrete dam**
Water Treatment plant	
Flocculation & Sedimentation	• **Hydraulic Flocculators (Horizontal Flow Baffled Channel Basins)** • Horizontal Flow Sedimentation Tanks • Vertical Flow Sludge Blanket Sedimentation Tanks. • Proprietary Designs e.g. Pulsator Clarifiers from Degremont (France), PCI. • Circular Centifloc Clarifiers with Mechanical Sludge Scrappers
Filtration	• **Rapid Sand Filters** • Slow Sand Filters • Pressure Filters
Disinfection	• Ozonation • Ultra-Violet Radiation • On-Site Electrolytic Generation of Hypochlorite Solution • **Chlorination using Chlorine Gas or other Chlorine Compounds**
Raw Water Mains	•
Treated Water Mains	•

Pipeline route	• Alternative A – Passing through Chepsir, Chepseon & Kedowa towns (LVWSB jurisdiction area), - through 14.3 km tunnel – farmland & Rural roads to Njoro- Njoro Nakuru road to Ngata. • Alternative B – Passing through County bounder of Nakuru & Kericho (in a forested area), - through 14.3 km tunnel – farmland & Rural roads to Njoro-Njoro Nakuru road to Ngata. • Alternative C – Passing through County bounder of Nakuru & Kericho (in a forested area), - through 14.3 km tunnel – Along A104 road (Nakuru-Eldoret road), through Salgaa market to Ngata • **Alternative D – Passing through Chepsir, Chepseon & Kedowa towns (LVWSB jurisdiction area), - through 14.3 km tunnel – Along A104 road (Nakuru-Eldoret road), through Salgaa market to Ngata**
Transfer Tunnel	•
Bulk Distribution and Storage	•

2.3.4 Construction Techniques

The contractor will have to choose methods that least damage existing ecological systems. The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. Locally sourced materials such as stones, cement, sand, pipes and fittings that meet the Kenya Bureau of standards requirements will be used. At the same time materials such as valves that will be imported will meet the internationally accepted standards.

2.4 The Design of the Project

This includes a description of the design and activities that shall be undertaken during the project construction, operation and decommissioning phases;

2.4.1 The Dam Embankment and the Reservoir

The dam considered under this study is a Rock Fill Asphalt Concrete Dam. The planned crest elevation is 2420 m asl and is approximately 57 metres above the current river channel. At that elevation, the embankment crest length is estimated to be about 470 metres. The general arrangement includes a spillway located on the right bank of the valley and a low level diversion tunnel 4m wide x 4m high set within the left bank adjacent to the stream.

A tunnel will house the downstream release flow pipe and the off-take pipe for the raw water. Most of the materials required to construct the dam will be available in the immediate vicinity of the dam. The spillway cuts and identified borrow areas are will be sourced from areas of low permeability required for the construction of the dam core.

Materials for embankment fill will be materials generally available within the reservoir basin and adjacent locations. The most economical construction for the dam embankment is one that will utilize the materials found within reasonable haulage. The hard stone sites will provide the materials needed for the external shell as well as select materials required for the filter zones, toe drainage zones and base gravel for rip-rap. These materials have been tested and passed the required suitability tests.

Clean sand will be required for manufacture of concrete and for seepage control filter layers within the embankment. The requirements are that the sand needs to be hard, durable and able to withstand disintegration from mechanical or chemical weathering. There are no sources of clean sand within the project site. Known possible sources in the wider area include the following:

- ✓ Sondu – Arawo River – Katito - Sondu Road
- ✓ Katito - Kendu Bay Road –

Sand will be transported from these sites.

It is these characteristics of available materials that led to the choice of embankment fill of ROCK FILL with an impervious membrane made of asphalt bitumen.

The proposed Itare dam and treatment works will sit on approximately 1000 acres of land. The land had been earmarked for the dam development in the early 1980's. Most of the land belongs to the proponent, RVWSB, while the rest belongs to KFS and individuals who were allocated the land in the Tinet / Kaongoi Settlement scheme. The proponent is ready to acquire about 220 acres of the land not in its custody.

2.4.2 Proposed Dam Site Access and Relocation of Existing Access Road

It is proposed to upgrade the existing road from Sitoito Market to an all-weather road i.e. gravel/ murram standard. The existing road heading to Ndoinet Forest Reserve will be diverted to pass through a quarry as it is currently passing through the proposed dam reservoir and it will be submerged in future.

2.4.3 Proposed Raw Water Pipeline

The raw water pipeline is designed to convey untreated water by gravity from the dam reservoir to the treatment works nearly 1.8 km downstream of the dam. It is proposed to abstract 105,000 m^3/day (4,375 m^3/h).

2.4.4 Hydro-Turbine Power Station

It is furthermore proposed to harness some of the water energy in the raw water transmission pipeline by installing a hydro turbine before the entry/mixing chamber. Based on a flow rate of 800 -1000 m^3/h and a head of 20-30 m (which has been allowed for in the hydraulic design of the pipeline) the hydro turbine could be supplying some 14 - 18 kW. This would be sufficient to power one backwash pump during the day and the site/ building lighting at night. However, this proposal is still under consideration and will be determined once the detail pipeline hydraulics and dam design are undertaken.

2.4.5 Proposed Water Treatment Works

The proposed location for the new Itare Water Treatment Works is approximately 38 km South West of Molo Town, at Survey of Kenya Co-ordinates N 9950000, E 779600, Arc 1960 Datum.

The site is approximately 2 km off the proposed Itare Dam location, on the downstream side of the dam.

The proposed Itare Water Treatment Works, capacity 105,000 m^3/d, will comprise the following key units:

- ✓ Inlet and mixing works - Stilling Basin and Overflow Facilities, Vertical Flow Baffled (over and under) to facilitate raw water mixing with chemicals. Raw Water Flow Measurement (900 V-notch).
- ✓ 4 No. Hydraulic flocculators, Horizontal flow (around the end) baffle channel basins, for Flocculation of raw water, with sufficient scour pipes to allow removal of deposits.
- ✓ 4 No. Horizontal Flow Rectangular Sedimentation Basins, each comprising inlet, settlement and outlet zones.
- ✓ 8 No. Rapid Gravity Sand Filters, each with a Filter Bed area of 13 m x 9 m (117 m^2) including Filter Gallery and Filter Control Room
- ✓ Clear Water Contact Tank - Reinforced Concrete Tank, internal dimensions 25 m x 25 m x 4 m high, Capacity 2,500 m^3, to provide contact time of approximately 30 minutes to allow sufficient disinfection.
- ✓ Pump House & Air Blower Room with Pumps and Air Blowers for filter backwashing.
- ✓ Back wash tank - Steel Elevated Tank Capacity 1000 m^3. At sufficient elevation for filter backwashing and to provide water for use within Treatment works area.
- ✓ 4 No. Sludge Drying Beds, total surface area 2,400 m^2

- ✓ Backwash Water Lagoons, with total storage volume of 6,100m^3, and Backwash Water Recirculation Pumps.
- ✓ Chemical Storage Building for Alum, Soda Ash, Polyelectrolyte and Hypochlorite - floor area 900 m^2 - to provide 3 months storage at the design throughput of 105,000 m^3/d.
- ✓ Chemical Mixing and Dosing Building - floor area 530 m^2, with Mixing Tanks, Dosing Pumps and Associated Pipework for Alum, Soda Ash, Polyelectrolyte and Hypochlorite.
- ✓ Gas Chlorination Building - floor area 256 m^2, comprising of a Gas Chlorinators Room and a Chlorine Drum Store for 3 months storage at the design output of 105,000 m^3/d
- ✓ Administration Building, total office floor area 700 m^2, with Laboratory, staff room for the treatment works operators & subordinate staff - incorporating Wash rooms (wcs and Showers), Locker rooms, Tea Room & Kitchen.
- ✓ Workshop & Store - floor area 225 m^2
- ✓ Generator House & Switch Room - floor area 52 m^2 incorporating stand-by Generator Room, Fuel Store and Electrical Switchboard/Distribution Panel Room.
- ✓ Gate House - floor Area 19m^2 including a security office and a toilet.
- ✓ Ancillary works will include roads and parking, waste water disposal system, chain link fence, electricity supply and 28 staff housing units.

The layout of the Treatment Works is planned in such a way that the operators can move easily amongst the various components on paved footpaths. The Administration Building to be located and positioned in such a way to allow the Works Manager and Treatment Works Coordinator to have clear, unobstructed views of the other structures in the Treatment Works.

The Chemical Storage Building, Chemical Mixing & Dosing Building, Gas Chlorination House and Workshop/ Store are located to allow easy access for deliveries of chemicals and other supplies.

Provision has been made in planning the Treatment Works Layout for future expansion of the Works.

2.4.6 Proposed Water Supply to Kiptororo and Tinet Locations

It is proposed that a small water supply scheme be designed to supply residents in Kiptororo and Tinet locations who reside near the dam site. The water supply scheme should target to supply residents near the dam and treatment works. Various

alternatives will be considered and a suitable option of the scheme recommended for construction.

It is proposed to supply the residents by pumping water from the treatment works to an elevated tank at a suitable location. From the elevated tank water will be gravitated to supply water kiosks at agreed locations where people can easily access. Consultations will be done with the community and RVWSB to agree on the locations of these water kiosks.

This scheme will keep to existing road reserve as much as possible and acquisitions will be done when need arises but before construction starts.

2.4.7 Treated Water Pipeline

The treated water pipeline will be a 1.2 m diameter pipe. It will transmit water by gravity from the clear water tank at the treatment works to the proposed Ngata reservoir site in Nakuru. Part of the conduit will have to be laid within a tunnel through the Mau Escarpment at a saddle between Molo and Londiani towns. It is proposed to convey a minimum of 100,000 m^3/day (4,375 m^3/h) from WTP to the tunnel end.

The 38km starting at WTP traverses virgin forest land and will need an access road.

Along the road reserve on highways B1 and A104 there are utilities such as telecommunication cables lain underground and overhead power lines for which the relocation and/or proper handling will require substantial financial resources.

There pipeline crosses an oil pipeline as it turns off the A104 at Ngata.

2.4.8 Proposed Off-Take to the Existing Water Supply Facilities

It is proposed to provide several off-takes along the bulk transfer pipeline from the treatment plant to Ngata Reservoir to supply Molo, Njoro, Elburgon and Salgaa towns. The proposed off-takes will include an off-take tee and bulk meter chamber with all the necessary fittings. The proposed off-takes will be sized to meet the proportioned projected 2040 demand for the respective towns. This particular assignment doesn't include the transmission pipelines to the towns. Consequently this RAP will not cover the mentioned towns.

2.4.9 Bulk Supply Transfer Tunnel

This will be a 14.3 km tunnel. The final cross-sectional dimensions will be determined by working space and ventilation requirements. A tentative design indicates a horse-shoe type of tunnel with internal dimensions of 2.5m wide and 2.25m high.

The DN 1200 diameter pipe will be installed at the bottom of the tunnel with a coarse sand cushion backfilling all around the pipe. Then a reinforced concrete cover plate of 100 mm thickness will be set on the cushion as the maintenance platform of the tunnel.

There won't be need for land acquisition since the tunnel lies as deep as 200m from the ground surface, hence activities of the owners of the land at ground level will not be affected except at positions of access shafts. At locations of shafts the land will be acquired from respective owners and be fenced off. These positions will be determined when the contractor starts work since exact locations such facilities are dependent upon the contractor's approach to execution of work.

2.4.10 Bulk Storage

It is proposed to construct a 5,000 m^3 tank at Ngata. There is 1 acre land available at this location, however, more land will be required. It is also proposed to construct 4 No. additional tanks which will increase the existing storage capacity. It is proposed to increase the existing storage capacity to about 30% of the daily production expected after the implementation of the project. With the additional 85,000 m^3/day produced from Itare dam and nearly 50,000 m^3/day from the existing facilities, the total production is expected to be 135,000 m^3/day in 2033. In order to meet the minimum storage requirements, the total storage capacity in Nakuru should achieve 40,000 m^3.
An additional storage capacity of some 16,500 m^3 is required. Under this project, it is required to construct 4 No. additional storage tanks within Nakuru town.

Land will be acquired in order to construct the tanks at the proposed sites. The identified tank sites are on public land hence land acquisition will not be a tedious process. The size of the lands to be acquired will be confirmed once the actual capacities of the tanks are agreed upon with the Client.

2.4.11 Bulk Distribution Mains

It is proposed to lay independent bulk distribution mains from the proposed Ngata tank to connect to all the existing tanks as well as to the proposed tanks within Nakuru. The total length is anticipated to be nearly 30 km of pipeline. The pipelines will either be steel or ductile iron.
The distribution mains cross the railway line and oil pipeline and several roads, including the crossing the A104 twice.

2.5 Materials to Be Used, Products and By-Products and Wastes to be generated

The materials to be used, products and by-products are discussed in the latter chapters that detail each component to depth. Also, wastes to be generated by the project and the methods of their disposal are discussed in respective sections.

2.6 Tendered Cost of Selected Project Alternative

The investment cost estimates made have been developed taking the following as a Basis of Cost Estimate:

- ✓ Applying rates used in on-going similar works Kenyan construction contracts
- ✓ Soliciting quotations from reputable suppliers of various materials for civil works construction and building into this quotations a profit and overhead factor

Due to the magnitude of the investment required and for ease of implementation, it was recommended to split the project construction works in suitable Lots as follows:

- ✓ LOT 1: Dam Works.
- ✓ LOT 2: Water Treatment Works
- ✓ LOT 3: Bulk Transfer Tunnel Works (Inc. pipeline)
- ✓ LOT 4: Bulk Transfer Pipelines
- ✓ LOT 5: Bulk Reservoir Storages and Bulk Distribution Pipelines

Table 2-3 shows the proposed investment costs summary

Table 2-3: Proposed Investment Costs Summary

Component	Amount (KES)
PRELIMINARY ITEMS	5,691,372,455.65
LOT 1: DAM WORKS	7,779,553,482.74
LOT 2: WATER TREATMENT PLANT	2,124,605,622.88
LOT 3: BULK TRANSFER TUNNEL	4,725,325,021.27
LOT 4: BULK TRANSFER PIPELINES	4,838,966,069.31
LOT 5: BULK STORAGE RESERVOIRS & DISTRIBUTION LINES	1,179,718,579.76
SUB-TOTAL	**28,973,495,354.79**
TAXES	**4,635,759,256.77**
TOTAL	**33,609,254,611.55**

Investments are assumed to be disbursed during the construction period from 2014 to 2017 as follows:

Project Implementation Costs	yr	2015	2016	2017	2018
Disbursement	%	30%	25%	25%	20%

Following completion and commissioning of the project, the facilities are assumed to commence operating in 2019, which is the first year that benefits from the project are expected.

3 DESCRIPTION OF APPLICABLE NATIONAL ENVIRONMENTAL LEGISLATIVE, POLICY, ADMINISTRATIVE AND REGULATORY FRAMEWORK

This chapter is a description of the national environmental legislative, policy, administrative and regulatory framework related to the project.

3.1 An Overview

Environmental Impact Assessment is a tool for ensuring new projects and programmes incorporate appropriate measures to mitigate adverse impacts to the environment and peoples' health and safety as well as enhancing sustainable operations with respect to environmental resources and co-existence with other socio-economic activities in their neighborhood. Recent GOK efforts aimed at formulating a clear policy strategy has culminated in the enactment of a new legislation on water management. The Water Act 2002 is aimed at harmonizing and streamlining the management of water resources, water supply and sanitation services (see outline and sample extracts in annex IV). Necessary policies and legislation that ensures annual environmental audits (EA) are carried out on every running project, activity or programme and a report submitted to National Environmental Management Authority (NEMA) for approval and issuance of relevant certificates.

3.2 Policy Provisions

3.2.1 The Constitution of Kenya

Article 42 of the Bill of Rights of the Kenyan Constitution provides that 'every Kenyan has the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures'. Under Chapter 5 (land and Environment), Part 1 is devoted to land. It requires that land be used and managed in 'a manner that is equitable, efficient, productive and sustainable, and in accordance with the following principles;

(i) Equitable access to land

(ii) Security of land rights

(iii) Sustainable and productive management of land resources

(iv) Transparent and cost effective administration of land

(v) Sound conservation and protection of ecologically sensitive areas

Part 2 of Chapter 5 of the constitution is dedicated to Environment and Natural Resources. Article 69 in Part 2 provides that the state shall;

(i) Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits

(ii) Work to achieve and maintain tree cover of at least ten per cent of the land area of Kenya

(iii) Encourage public participation in the management of, protection and conservation of the environment

(iv) Protect genetic resources and biological diversity

(v) Establish systems of environmental impact assessment, environmental audit and monitoring of the environment

(vi) Eliminate processes and activities that are likely to endanger the environment

(vii) Utilize the environment and natural resources for the benefit of the people of Kenya

Further, Article 70 states that if a person alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress. The sub-project should ensure compliance with the constitution in so far as equitable sharing of the resources, between the stakeholders. Further, the project should ensure the sustainability of livelihoods and biological resources within the project areas are protected. Any development proposals should also be cognizant of the increased powers under the Constitution given to communities and individuals to enforce their rights through legal redress

The Constitution of Kenya, The provisions of Chapter IV (Protection of Fundamental Rights and Freedoms of The Individual) protects citizens from deprivation of property. No property of any description shall be compulsorily taken possession of, and no interest in or right over property of any description shall be compulsorily acquired, except where it is necessary for public interest.

Every person has also the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures. Chapter V (Land and Environment) of the constitution gives provisions of protecting land, environment and natural resources. The State is required to:-

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

b) Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;

c) Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;

d) Encourage public participation in the management, protection and conservation of the environment;

e) Protect genetic resources and biological diversity;

f) Establish systems of EIA, environmental audit and monitoring of the environment;

g) Eliminate processes and activities that are likely to endanger the environment; and

h) Utilize the environment and natural resources for the benefit of the people of Kenya.

Every person has a legal duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

3.2.2 The Kenya Vision 2030

Kenya Vision 2030 is the current national development blueprint for period 2008 to 2030 and was developed following on the successful implementation of the Economic Recovery Strategy for Wealth and Employment Creation which saw the country's economy back on the path to rapid growth since 2002. GDP growth rose from 0.6% to 7% in 2007, but dropped to between 1.7% and 1.8% in 2008 and 2009 respectively. The objective of the vision 2030 is to transform Kenya into a middle income country with a consistent annual growth of 10 % by the year 2030". The 2030 goal for urban areas is to achieve "a well-housed population living in an environmentally-secure urban environment." This will be achieved by bringing basic infrastructure and services namely roads, street lights, water and sanitation facilities, storm water drains, footpaths, and others.

One of the aims of the vision is to make Kenya to be a nation that has a clean, secure and sustainable environment by 2030. This will be achieved through promoting environmental conservation to better support the economic pillar. Improving pollution and waste management through the application of the right economic incentives in

development initiatives is critical. The current land use practices in the country are incongruent with the ecological zones. For instance, large portions of land in high potential areas have been subdivided into uneconomic parcels, while some parts of land in the medium and low potential areas are rapidly being converted into agriculture, despite the fragile environment they are located in.

The Kenya Vision 2030 aspires for the country firmly interconnected through a network of roads, railways, ports, airports, water and sanitation facilities and telecommunications.

According to Vision 2030, Kenya is a water scarce country. The economic and social developments anticipated by Vision 2030 will require more high quality water supplies than at present.

The country, therefore, aims to conserve water sources and start new ways of harvesting and using rain and underground water. The 2030 Vision for water and sanitation is to ensure that improved water and sanitation are available and accessible to all.

3.2.3 State of the Environment Report 2010 (SoE)

Chapter 4 states that Kenya is home to five hot spots of globally important biodiversity and 61 important bird areas (IBAs). Kenya's known biodiversity assets include 7,000 plants, 25,000 invertebrates (21,575 of which are insects), 1 133 birds, 315 mammals, 191 reptiles, 180 freshwater fish, 692 marine and brackish fish, 88 amphibians and about 2 000 species of fungi and bacteria. The Country is ranked third in Africa in terms of mammalian species' richness with 14 of these species being endemic to the country. The country is famous for its diverse assemblage of large mammals like the African elephant (*Loxodonta africana*), black rhino (*Diceros bicornis*), leopard (*Panthera pardus*), buffalo (*Syncerus cafer*) and African lion (*Panthera leo*) (NEMA 2009a).

Of the 7,000 plant species occurring in Kenya, 146 species have been assessed according to the IUCN Threat Criteria (2008) and 103 have been categorized as being threatened (critically endangered, endangered or vulnerable). Although the country's flora numbers have shot up due to the influx of invasive alien species, the invasive species pose a major threat to indigenous biodiversity.

In order to effectively stem the loss of plant populations and the associated genetic diversity, the country should prioritize development of a national plant conservation strategy.

3.2.4 National Policy on Water Resources Management and Development

The National Policy on Water Resources Management and Development (Sessional Paper No. 1 of 1999) was established with an objective to preserve, conserve and protect available water resources and allocate it in a sustainable rational and economic way. It also desires to supply water of good quality and in sufficient quantities to meet the various water needs while ensuring safe disposal of wastewater and environmental protection. The policy focuses on streamlining provision of water for domestic use, agriculture, livestock development and industrial utilization with a view to realizing the goals of the Millennium Development Goals (MDGs) as well as Vision 2030. To achieve these goals, water supply (through increased household connections and developing other sources) and improved sanitation is required in addition to interventions in capacity building and institutional reforms

While the National Policy on Water Resources Management and Development (1999) enhances a systematic development of water facilities in all sectors for promotion of the country's socio-economic progress, it also recognizes the byproducts of this process as waste water. It, therefore, calls for development of appropriate sanitation systems to protect people's health and water resources from institutional pollution. Development projects, therefore, should be accompanied by corresponding waste management systems to handle the waste water and other waste emanating there from. The same policy requires that such projects should also undergo comprehensive EIAs that will provide suitable measures to be taken to ensure environmental resources and people's health in the immediate neighborhood and further downstream are not negatively impacted by the emissions.

In addition, the policy provides for charging levies on waste water on quantity and quality (similar to polluter-pays-principle) in which case those contaminating water are required to meet the appropriate cost on remediation, though the necessary mechanisms for the implementation of this principle have not been fully established under the relevant Acts. However, the policy provides for establishment of standards to protect the water bodies receiving wastewater, a process that is on-going.

3.2.5 Sessional Paper No. 6 of 1999 on Environment and Sustainable Development

Among the key objectives of the Sessional Paper No. 6 of 1999 on Environment and Sustainable Development (1993) are;

(i) To ensure that from the onset, all development policies, programs and projects take environmental considerations into account,

(ii) To ensure that an independent environmental impact assessment (EIA) report is prepared for any development before implementation,

(iii) To ensure that effluent treatment standards which will conform to acceptable health standards?

Under this paper, broad categories of development issues have been covered that require sustainable approach. These issues include the waste management and human settlement sectors. The policy recommends the need for enhanced reuse/recycling of residues including wastewater and increased public awareness raising and appreciation of clean environment as well as the participation of stakeholders in the management of wastes within their localities. Regarding human settlement, the paper encourages better planning in both rural and urban areas and provision of basic needs such as water, drainage and waste disposal facilities among others for decent housing of every family.

3.2.6 The Land Policy

To restore the environmental integrity the government shall introduce incentives and encourage use of technology and scientific methods for soil conservation and maintain beaches at high and low water mars and put in place measures to control beach erosion. Fragile ecosystems shall be managed and protected by developing a comprehensive land use policy bearing in mind the needs of the surrounding communities. Zoning of catchment areas to protect them from further degradation and establishing participatory mechanisms for sustainable management of fragile ecosystems will also be done. It will also develop procedures for co-management and rehabilitation of forest resources while recognizing traditional management systems and sharing of benefits with contiguous communities and individuals. Lastly all the national parks, game reserves, islands, front row beaches and all areas hosting fragile biodiversity are declared as fragile ecosystems.

Conservation and sustainable management of land based natural resources. The sustainable management of land-based natural resources depends largely on the governance system that defines the relationships between people, and between

people and resources. To achieve an integrated approach to management of land based natural resources, all policies, regulations and laws dealing with these resources shall be harmonized with the framework established by the Environmental Management and Coordination Act (EMCA1999).

3.2.7 Culture Heritage Policy

To this end, the *Culture Heritage policy* has led to the *Draft Culture Bill* which seeks to address art and cultural history. The *Draft Bill* makes two broad distinctions in Traditional Knowledge (TK) and Expressions of folklore (EF). Although the draft offers definitions for each of these as follows:-

"Traditional knowledge" shall refer to any knowledge originating from a local or traditional community that is the result of intellectual activity and insight in a traditional context, including know-how, skills, innovations, practices and learning, where the knowledge is embodied in the traditional lifestyle of a community, or contained in the codified knowledge systems passed on from one generation to another. The term shall not be limited to a specific technical field, and may include agricultural, environmental or medical knowledge, and knowledge associated with genetic resources.

"Expressions of folklore" are any forms, whether tangible or intangible, in which traditional culture and knowledge are expressed, appear or are manifested, and comprise the following forms of expressions or combinations thereof:

- ✓ Verbal expressions, such as but not limited to stories, epics, legends, poetry, riddles and other narratives; words, signs, names, and symbols;
- ✓ Musical expressions, such as but not limited to songs and instrumental music;
- ✓ Expressions by movement, such as but not limited to dances, plays, rituals and other performances; whether or not reduced to a material form;
- ✓ Tangible expressions, such as productions of art, in particular, drawings, designs, paintings (including body-painting), carvings, sculptures, pottery, terracotta, mosaic, woodwork, metal ware, jewelry, basketry, needlework, textiles, glassware, carpets, costumes; handicrafts; musical instruments; and architectural forms;

3.2.8 Guidelines for Prevention and Control of Soil Erosion in Road Works

The guidelines provide brief introductions on the planning, costing and construction of soil and water conservation structures commonly used in rural road infrastructure delivery. The guidelines present illustrations real life examples and work methodologies that assist engineers and contractors to develop effective construction and supervision techniques, on the prevention and control of soil erosion in road works.

The guidelines provide basic information on techniques for the identification and assessment of challenges and planning of mitigation measures related to erosion control works. The guidelines also provide tips on, among others:

- ✓ The design and construction of waterways and soil erosion control measures in the road drainage systems
- ✓ Soil erosion control measures needed in the upper and lower catchment areas to reduce soil erosion and mitigate against anticipated damages from the road drainage discharge
- ✓ Some solutions for soil erosion control on road sections with specific conditions not catered for in standard designs,
- ✓ The use of Vetiver grass to stabilize and heal erosion damages, and
- ✓ Costing of works related to prevention and control of soil erosion

The Guidelines have been developed primarily to benefit Engineers and Technicians, Contractors and their Supervisors, Consultants and other potential users involved in road works who are often not aware of the extent of damages caused by uncontrolled runoff from the road servitude. Established Contractors, Professional Engineers, District Agricultural Officers, Environmentalists, Programme Managers and Planners may also use these guidelines as a reference for some of their planning, design and supervision works.

These guidelines are intended to introduce basic soil and water conservation principles and techniques, related to road works. They are by no means exhaustive.

Mitigation measures proposed in this report for mitigation of soil erosion impacts have borrowed from these guidelines.

3.2.9 Environmental Guidelines for Roads and Bridges, 2010

The Environmental guidelines for roads and bridges provide detailed analysis of environmental issues arising from road works along with mitigation measures that have been used successfully in national and international contexts. The guidelines identify the direct and indirect effects from road works on the biophysical environment – land, water, air, vegetation, etc as well as the socio-economic and cultural environments for instance, public health, welfare and safety and valued traditions from the present and past.

The guidelines underscore the importance of public consultations and participation in all aspects of road transportation development, thereby ensuring accountability, fairness and sustainability.

However, the guidelines do not address environmental impacts from road transport, including:

- ✓ Vehicle emissions that degrade air quality, e.g. Carbon dioxide, ozone, nitrous oxides etc.;
- ✓ Road safety issues that arise from unsafe road designs, failure to correct black spots, etc.;
- ✓ Vehicle inspections that require repairs to ensure road-worthiness for all transport modes;
- ✓ Passenger safety viz. Use of seat belts; and
- ✓ Vehicle overloading.

Environmental guidelines for roads and bridges, 2010 cover the following guidelines for activities that can affect the water quality:

- ✓ Contractor camp guidelines;
- ✓ Site preparation guidelines;
- ✓ Earthworks guidelines;
- ✓ Drainage guidelines;
- ✓ Borrow pit guidelines;
- ✓ Rock quarries guidelines;
- ✓ Sand sources guidelines;

3.3 Legal Framework

Applications of national statutes and regulations on environmental conservation suggest that the Coast Development Authority will have a legal duty and social responsibilities to ensure the proposed dam development is carried out without compromising the status of the natural resources in the area, environment resources, social and cultural setting as well as the economic potential of the local communities health and safety. This position enhances the importance of this environmental impact assessment for the proposed site to provide a benchmark for its sustainable operation. The key national laws that govern the management of environmental resources in the country have been briefly discussed below. It is noteworthy that wherever any of the laws contradict each other, the Environmental Management and Co-ordination Act 1999 prevails.

There are many laws and regulations governing issues of environmental concern in Kenya. The principal National legislation is the Environmental Management & Coordination Act of 1999 typically referred to as EMCA. EMCA empowers stakeholders to participate in sustainable management of the natural resources. It calls for Environmental Impact assessment (EIA) (under Section 58) to guide the implementation of environmentally sound decisions. Projects likely to cause

environmental impacts require that an environmental impact assessment study to be carried out. It is under this provision that the current study is being undertaken.

The following is an outline of the legislative, policy and regulatory framework for which the Proponent shall observe and implement in an effort to comply with Environmental Sustainability.

3.3.1 The Environment Management and Co-ordination Act, 1999

The second schedule of EMCA stipulates that an EIA is required for:

4. Dams, rivers and water resources including –

- ✓ Storage dams, barrages and piers;
- ✓ River diversions and water transfer between catchments;
- ✓ Flood control schemes;
- ✓ Drilling for the purpose of utilizing ground water resources including geothermal energy.

The Act covers virtually all diverse environmental issues which require a holistic and coordinated approach towards its protection and preservation for the present generation without compromising the interests of the future generation to enjoy the same. Consequently, the Act provides for the legal regime to regulate, manage, protect and conserve biological diversity resources and access to genetic resources, wetlands, forests, marine and freshwater resources and the ozone layer to name a few.

The Environmental Management and Coordination Act (EMCA) 1999 harmonizes the various requirements of the other existing laws and regulations by stipulating that where the provisions of any existing law conflicts with itself, then the provisions of the EMCA shall prevail. This way, the EMCA is able to minimize any conflicts in enforcement of the various environmental laws and regulations as applied to the relevant sectors. EMCA represents the culmination of a series of initiatives and activities coordinated by Government and stakeholders. It accentuates the right of every person in Kenya to live in a clean and healthy environment and obliges each and every one to safeguard and enhance the environment. It is the master plan for the environment in Kenya and contains a National Environment Policy, Framework Environmental Legislation and Environmental Strategy.

The Act consists of Sectoral Plans for the medium and long term intended to lead to sustainable development in the country. EMCA puts special emphasis on environmental management, pollutions and nuisances, and the necessity to safeguard the well-being of the populations.

The Environmental Management and Coordination Act (EMCA) 1999 is the national legislation guiding Environmental Management in Kenya. A draft bill (*Proposed Environmental Management and Coordination Act (EMCA) (Amendment) Bill 2013)* is before Parliament to further guide Environmental Management.

Topmost in the administration of EMCA is National Environment Council (NEC), which formulates policies, set goals, and promotes environmental protection programmes. The implementing organ is National Environment Management Authority (NEMA). EMCA comprises of the parts covering all aspects of the environment.

In relation to water resources, Section 42 of the Act deals specifically with the protection of rivers, lakes and wetlands. The Act forbids interference with water bodies without the express permission from the National Environmental Management Authority (NEMA) Director General. The permission can be granted subject to the findings of an Environmental Impact Assessment.

3.3.2 EMCA Regulations

e) Environmental Impact Assessment and Audit Regulation 2003

The Environmental (Impact Assessment and Audit) Regulations, 2003 thus expressly state in Regulation 3 that "the Regulations shall apply to all policies, plans, programmes; projects and activities specified in Part IV, Part V and the Second Schedule of the Act".

Regulation 4(1) further states that:

''…no Proponent shall implement a project:

(a) likely to have a negative environmental impact; or

(b) for which an environmental impact assessment is required under the Act or these Regulations, unless an environmental impact assessment has been concluded and approved in accordance with these Regulations…''

Environmental Impact Assessment is a tool for environmental conservation and has been identified as a key component in on-going project execution. Section 58 of the Environmental Management and Coordination Act (EMCA) Number 8 of 1999, Second Schedule 9(i), and Environmental (Impact Assessment and Audit) Regulation 2003, stipulate that both new and old projects must undergo Environmental Impact Assessment and Audits. This is necessary as many forms of developmental activities cause damage to the environment and hence the greatest challenge today is to maintain sustainable development without interfering with the environment. There are

many environmental problems and challenges in Kenya today among them land degradation, water management and environmental pollution. This is aggravated by lack of awareness and inadequate information amongst the public on the consequences of their interaction with the environment. According to Kenya Subsidiary Legislation, 2003 part V of the EIA and EA regulation, provides for environmental Audit and monitoring. The policy recommends the need for enhanced reuse/recycling of residues including waste water and use of non-waste technologies. It recommends participation of stakeholders in the management of wastes within their localities. It encourages better planning in both urban and rural areas and provision of basic needs such as water, drainage and waste disposal facilities.

f) Water Quality Management Regulations, 2006 (Legal Notice No. 120) (Water Quality)

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

Regulation 8 of these regulations provides for compliance with water quality standards. It states that "all operators and suppliers of treated water, containerized water and all water vendors shall comply with the relevant quality standards in force as may be prescribed by the relevant lead agencies".

Regulation 9 of these regulations provides for water quality monitoring. It states that the "Authority in consultation with the relevant lead agency, shall maintain water quality monitoring for sources of domestic water at least twice every calendar year and such monitoring records shall be in the prescribed form as set out in the second schedule to these regulations". Table below shows the quality standards for sources of domestic water.

Table 3-1: Quality Standards for Sources of Domestic Water.

Parameter	Guide Value (Maximum allowable)
pH	6.5 – 8.5
Suspended solids	30 (mg/l)
Nitrate – NO3	10 (mg/l)
Ammonia – NH3	0.5 (mg/l)

Nitrite – NO2	3 (mg/l)
Total dissolved solids	1200 (mg/l)
Ecoli	Nil/100ml
Fluoride	1.5 (mg/l)
Phenols	Nil (mg/l)
Arsenic	0.01 (mg/l)
Cadmium	0.01 (mg/l)
Lead	0.05 (mg/l)
Selenium	0.01 (mg/l)
Copper	0.05 (mg/l)
Zinc	1.5 (mg/l)
Alkyl benzyl sulphonates	0.5 (mg/l)
Permanganate Value (PV)	1.0 (mg/l)

Everyone is required to refrain from any actions, which directly or indirectly cause water pollution, whether or not the water resource was polluted before the enactment of the Environmental Management and Coordination Act (*EMCA*) gazetted in 1999. It is an offence to contravene the provisions of these regulations with a fine not exceeding five hundred thousand shillings.

According to these regulations, "Every person shall refrain from any action which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of the Act".

g) Waste Management Regulations, 2006 (Legal Notice No. 121)

The *Waste Management Regulations, 2006* aim to protect human health and the environment by streamlining the handling, transportation and disposal of various types of waste. The regulations place emphasis on waste minimization, cleaner production and segregation of waste at source. The regulations have classified various types of waste and recommended appropriate disposal methods for each waste type.

The regulation requires licensing of transporters of wastes and operators of disposal site (sections 7 and 10 respectively). In section 14 (1) every trade or industrial

undertaking is obliged to install anti- pollution equipment for the treatment of waste emanating from such trade or industrial undertaking. The Developer shall ensure that the garbage collector contracted has a valid license from the National Environment Management Authority (NEMA).

The *Waste Management Regulations, 2006* states the life, health and wellbeing of people as a chief environmental value in relation to waste management.

This value is relevant to the Project as its alignment covers settled areas, areas of ecological value and areas of productive agricultural land. The Project is likely to introduce hazardous waste generation, industrial wastewater and storm water at its fixed facilities.

Objectives for waste management is based on the waste management hierarchy of avoid, reduce, reuse, recycle, recover, treat and dispose. There may be in excess of 1000 workers on construction sites along the Project who will generate tonnes of garbage daily. Assuming a construction period of 4 years, this garbage will be too much and must therefore be dealt with using any one of the waste management hierarchy.

The construction mitigation measures proposed in the EMP in regard to waste management comply with the *Waste Management Regulations, 2006* as they seek to ensure that pollution does not emanate from project activities and if it does, transmission to receptors that would be adversely affected is intercepted.

h) Noise and Excessive Vibration Pollution Control Regulations, 2009

The key environmental values for the acoustic environment are outlined within *The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009* as follows:

PART II - GENERAL PROHIBITIONS

3. General Prohibitions.

(1) Except as otherwise provided in these Regulations, no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

(3) Any person who contravenes the provisions of this Regulation commits an offence.

4. Excessive vibrations.

(1) Except as otherwise provided in these Regulations, no person shall-

(a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or

(b) Cause to be made excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30 metres from any moving source;

(2) Any person who contravenes the provisions of this Regulation commits an offence.

5. Permissible noise levels.

No person shall make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property

Table 3-2: Maximum Permissible Noise Levels

Zone		Sound Level Limits dB (A)		Noise Rating Levels (NR)	
		(Leq, 14h)		(Leq, 14h)	
		Day	Night	Day	Night
A	Silent zone	40	35	30	25
B	Places of worship	40	35	30	25
C	Residential;indoor outdoor	45 50	35 35	35 40	25 25
D	Mixed residential	55	35	50	25
E	Commercial	60	35	55	25

Time Frame

Day: 6.01 a.m. – 8.00 p.m. (Leq, 14h)

Night 8.01 p.m. – 6.00 a.m. (Leq, 10h)

In the second schedule

Table 3-3: Maximum permissible noise levels for construction sites (measurement taken within the facility)

facility		***Maximum Noise Level Permitted (Leq)in dB (A)***	
		Day	*Night*
(i)	*Health facilities, educational institutions, homes for disabled*	*60*	*35*
(ii)	*Residential*	*60*	*35*
(iii)	*Areas other than those described in (i) and (ii) above*	*75*	*65*

Time Frame

Day: 6.01 a.m. – 6.00 p.m. (Leq, 12h)

Night 6.01 p.m. – 6.00 a.m. (Leq, 12h)

PART III- PROVISIONS RELATING TO NOISE FROM CERTAIN SOURCES

13. Construction at night.

(1) Except for the purposes specified in sub-Regulation (2) hereunder, no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations.

15. Environmental Impact Assessment.

Any person intending to carry out construction, demolition, mining or quarrying work shall, during the Environmental Impact Assessment studies-

(A) Identify natural resources, land uses or activities which may be affected by noise or excessive vibrations from the construction, demolition, mining or quarrying;

(b) Determine the measures which are needed in the plans and specifications to minimize or eliminate adverse construction, demolition, mining or quarrying noise or vibration impacts; and

(c) Incorporate the needed abatement measures in the plans and specifications.

These Regulations determine that no person or activity shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. In

determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered:

- ✓ Time of the day;
- ✓ Proximity to residential area;
- ✓ Whether the noise is recurrent, intermittent or constant;
- ✓ The level and intensity of the noise;
- ✓ Whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,
- ✓ Whether the noise is subject to be controlled without unreasonable effort or expense to the person making the noise.

This regulation also relates noise to its vibration effects and seeks to ensure no harmful vibrations are caused by controlling the level of noise. Any person(s) intending to undertake activities in which noise suspected to be injurious or endangers the comfort, repose, health or safety of others and the environment must make an application to NEMA and acquire a license subject to payment of requisite fees and meeting the license conditions. Failure to comply with these regulations attracts a fine of KES 350,000 or 18 months jail term or both.

The sensitive receptors identified in close proximity to the Project include:-

- ✓ Wildlife habitats
- ✓ Pastures
- ✓ Residential areas
- ✓ Commercial centres including schools and hospitals

i) Draft Air Quality Regulations 2008

These guidelines spell out qualities of the environment that are conducive to prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources such as mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in the Environmental Management and Coordination Act, 1999. It also covers any other air pollution source as may be determined by the Minister in consultation with the Authority. Emission limits for various areas and facilities have been set. The regulations provide the procedure for designating controlled areas, and the objectives of air quality management plans for these areas.

The objective of these Regulations is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. The general prohibitions state that no person shall cause the emission of air pollutants listed under First Schedule (Priority air pollutants) to exceed the ambient air quality levels as required stipulated

under the provisions of the Seventh Schedule (Emission limits for controlled and non-controlled facilities) and Second Schedule (Ambient air quality tolerance limits).

j) Environmental Management and Co-Ordination (Fossil Fuel Emission Control) Regulations 2006

The ***Environmental Management and Co-ordination (Fossil Fuel Emission Control) Regulations 2006*** came into operation in 2007 and sets out emission standards for petrol and diesel powered motor vehicles and bars the introduction into the air of substances which result in harmful effects of such nature as to endanger human health, harm living resources and ecosystems, cause material damage or interfere with amenities and other legitimate uses of the environment.

These Regulations set out emission standards for internal combustion engines, provide for the licensing of persons who treat fuel and for the appointment of environmental inspectors for purposes of emission inspection and authorizes the National Environment Management Authority to enter into partnerships for purposes of emission inspection. The Authority shall administer a system of emission inspection of mobile and stationary internal combustion engines in Kenya. An environmental inspector shall have the powers as defined by sections 117 and 118 of the Environmental Management and Co-ordination Act. Fuel shall be treated with fuel catalyst by persons licensed to do so by the Authority.

The *Environmental Management and Co-ordination (Controlled Substances) Regulations*, No. 73 of 2007(EMCA),

Part II

6. (1) No person shall store, distribute, transport or otherwise handle a controlled substance unless the controlled substance is accompanied by material safety data sheet

(2) Any person producing or importing a controlled substance shall at the time of production, packaging or importation, ensure that the material safety data sheet accompanies the produced, packaged or imported substance

Part III

11 (1) No person, shall import into Kenya a controlled substance unless such person has a valid license issued by the Authority.

3.3.3 The Water Act 2002

According to Section 5 of this Act, the right to use of water from any water resource is hereby vested in the Minister, except to the extent that it is alienated by or under this Act or any other written law.

Section 4 (1) of the same Act states, that the Minister shall have and may exercise control over every water resource in accordance with this Act.

Subsection 2 states that it shall be the duty of the Minister to promote the investigation, conservation and proper use of water resources throughout Kenya and to ensure the effective exercise and performance by any authorities or persons under the control of the Minister of their powers and duties in relation to water. Subsection 3 further states that the Minister shall be assisted in discharge of his duties under this Section by Director of Water.

Section 25 (1) of this Act states that a permit shall be required for any of the following purposes:

- ✓ Any use of water from a water resource, except as provided by Section 26;
- ✓ The drainage of any swamp or other land;
- ✓ The discharge of a pollutant into any water resource; and
- ✓ Any purpose, to be carried out in or in relation to a water resource, which is prescribed by rules made under this Act to be a purpose for which a permit is required.

Part II, Section 18, of this Act provides for national monitoring and information system on water resources. Following on this, Sub-section 3 of the same Section, allows the Water Resources Management Authority (WRMA) to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may be required to be kept by a facility operator and the information thereof furnished to the authority.

Section 23 (1) of the Act states that the Authority shall not approve any community project unless:

- ✓ The proposed project is approved by the persons owning or occupying at least two-thirds of the particular area concerned in the project; and
- ✓ Provision is made by the project for adequate alternative supply of water to be supplied to permit holders likely to be adversely affected and unable to benefit from the scheme.

Sub-section 2 further states that no permit for the community project shall be cancelled or verified except with the consent of the Minister.

The Water Act, 2002 provides for establishment of 3 levels of institutions for the provision of services.

These are:

- ✓ Water Services Regulatory Board (WSRB);
- ✓ Water Services Boards (WSB); and
- ✓ Water Service Providers (WSP).

The Act sets out these institutions based on the principles of:

- ✓ Separation of water resources management from water services provision;
- ✓ Separation of policy, regulation and implementation functions within the water supply and sanitation sector in order to streamline the role of the various actors in the sector;
- ✓ Devolution of responsibilities for water services provision to wsps, who shall include the private sector, communities and companies formed by Local Authorities;
- ✓ Human resource redeployment and development leading to more effective and efficient institutions;
- ✓ The need to give full autonomy to water service providers to enable them perform without adverse interference or influence; and
- ✓ Improved delivery of services to customers.

Among them, the Water Resource Management Authority (WRMA) is a state corporation under the Ministry of Water and Irrigation established under the Water Act 2002 and charged with being the lead agency in water resources management.

The Water Act 2002 stipulates the duties of WRMA to include:

- ✓ Water apportionment and allocation, catchment
- ✓ Catchment protection and conservation,
- ✓ Water resource assessments and conservation,
- ✓ Delineation of catchment areas,
- ✓ Gazetting water protected areas,
- ✓ Protection of wetlands,
- ✓ Gazetting water schemes to be state and community owned,
- ✓ Establishing Catchment Management Strategies (CMS)
- ✓ Collecting water use and effluent discharges.

In order for WRMA to undertake its stipulated responsibilities, the Act provides for decentralized and stakeholder involvement. This will be implemented through regional offices of the Authority based on drainage basins (catchment areas) assisted by Catchment Area Advisory Committees (CAACs). At the grassroots level, stakeholder engagement will be through Water Resource User Associations (WRUAs).

k) Water Catchment Management Policies

The policy on water catchment 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.

l) The IWRM approach

The IWRM approach guided the preparation of this report. There was recognition of the water management principles, viz.

- ✓ Principle 1. Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.
- ✓ Principle 2. Water development and management should be based on a participatory approach, involving users, planners and policymakers at all levels.
- ✓ Principle 3. Women play a central part in the provision, management and safeguarding of water.
- ✓ Principle 4. Water has an economic value in all its competing uses and should be recognized as an economic good as well as a social good.

The Water Act 2002 is the national legislation guiding IWRM in Kenya. A draft bill (*Proposed Water Bill 2012)* is before Parliament to further guide implementation of IWRM.

3.3.4 Occupational Safety and Health Act, 2007

This is an Act of Parliament that provides for the safety, health and welfare of workers and all persons lawfully present at work places to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. Section 3 (1) states "that the Act shall apply to all workplaces where any person is at work, whether temporarily or permanently".

Under this Act, the duties of the Occupier are provided thus in Section 6:

- ✓ Every occupier shall ensure the safety, health and welfare at work of all persons working in his workplace.
- ✓ Without prejudice to the generality of an occupier's duty under subsection (1), the duty of the occupier includes:
- ✓ The provision and maintenance of plant and systems and procedures of work that are safe and without risks to health;
- ✓ Arrangements for ensuring safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances;

- ✓ The provision of such information, instruction, training and supervision as is necessary to ensure the safety and health at work of every person employed
- ✓ The maintenance of any workplace under the occupier's control, in a condition that is safe and without risks to health and the provision and maintenance of means of access to and egress from it that are safe and without such risks to health;
- ✓ The provision and maintenance of a working environment for every person employed that is, safe, without risks to health, and adequate as regards facilities and arrangements for the employees welfare at work;
- ✓ Informing all persons employed of
- ✓ Any risks from new technologies; and
- ✓ Imminent danger; and
- ✓ Ensuring that every person employed participates in the application and review of safety and health measures.
- ✓ Every occupier shall carry out appropriate risk assessments in relation to the safety and health of persons employed and, on the basis of these results, adopt preventive and protective measures to ensure that under all conditions of their intended use, all chemicals, machinery, equipment, tools and process under the control of the occupier are safe and without risk to health and comply with the requirements of safety and health provisions in this Act.
- ✓ Every occupier shall send a copy of a report of risk assessment carried out under this section to the area occupational safety and health officer;
- ✓ Every occupier shall take immediate steps to stop any operation or activity where there is an imminent and serious danger to safety and health and to evacuate all persons employed as appropriate.
- ✓ It is the duty of every occupier to register his workplace unless such workplace is exempted from registration under this Act.
- ✓ An occupier who fails to comply with a duty imposed on him under this section commits an offence and shall on conviction be liable to a fine not exceeding five hundred thousand shillings or to imprisonment for a term not exceeding six months or to both

Part VI of the Occupational Safety and Health Act, 2007, addresses provisions concerning health.

These provisions are:

- ✓ Cleanliness;
- ✓ Overcrowding;
- ✓ Ventilation;

- ✓ Lighting;
- ✓ Drainage of floors; and
- ✓ Sanitary conveniences.

These provisions are to be enforced by the Department of Occupational Health and Safety of the Ministry of Labour.

Failure to comply with the OSHA, 2007 attracts penalties of up to KES 300,000 or 3 months jail term or both or penalties of KES 1,000,000 or 12 months jail term or both for cases where death occurs and is in consequence of the employer.

The Environmental Value represented by this Act is that it seeks to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces. The dam area will become a workplace as defined by the Act and, henceforth, whether it is under construction or operation, all provisions of the said Act will apply.

m) Machinery Safety

Part VII of the Occupational Safety and Health Act, 2007 elaborately deals with machinery safety requirements, mainly from the point of view of avoiding accidents and injuries at work.

n) Safety –General Provisions

Part VIII of the Occupational Safety and Health Act, 2007 describes safety general provisions.

Section 74 (1) provides for storage. It states that “all goods, articles and substances stored in a workplace shall be stored or stacked –

- ✓ In such a manner as will ensure their stability and prevent any fall or collapse of the stack;
- ✓ In such manner as not to interfere with the adequate distribution of the natural or artificial light, the natural ventilation systems, the proper operation of machines or other equipment, the unobstructed use of passageways, gangways or traffic lanes, and the efficient functioning of sprinkler systems, the unobstructed access to other fire extinguishing equipment within the workplace; and
- ✓ On firm foundations not liable to overload any floor.

Section 76 (2) states that “Every employer shall take necessary steps to ensure that workstations, equipment and work tasks are adapted to fit the employee and the employee’s ability including protection against mental strain”.

According to Section 76 (3) “Every manufacturer, importer and supplier or an agent of a manufacturer, importer and supplier of the machinery and equipment referred to in

paragraph (1) shall ensure that the equipment complies with the safety and health standards prescribed under this Act and shall provide adequate and appropriate information including hazard warning signs".

Section 76 (4) further states that " An employer shall not require or permit any of his employees to engage in the manual handling or transportation of a load which by reason of its weight is likely to cause the employee to suffer bodily injury".

Other provisions covered under this Safety – general provisions include:

- ✓ Section 77: Safe means of access and safe place of employment;
- ✓ Section 78: fire prevention;
- ✓ Section 79: Precautions in places where dangerous fumes are likely to be present;
- ✓ Section 81: Safety provisions in case of fire; and
- ✓ Section 82: Evacuation procedures.

Part IX of the Occupational Safety and Health Act, 2007 also provides for Chemical Safety,

Part X provides for Welfare – General Provisions,

Part XI Health, Safety and Welfare Special Provisions and

Part XII special applications.

3.3.5 The Public Health Act (Cap. 242),

The *Public Health Act (Cap. 242)*, in Part IX Section 8 & 9 states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Any noxious matter or waste water flowing or discharged into a water course is deemed as a nuisance. Part Xll Section 136 states that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitates the breeding or multiplication of pests shall be deemed nuisances The Act addresses matters of sanitation, hygiene and general environmental health and safety. These provisions should be adhered to especially during the construction stage of the project. Appropriate mitigation measures should be instituted to comply with these requirements.

3.3.6 Energy Act Of 2006

The Energy Act of 2006 replaced the Electric Power Act of 1997 and The Petroleum Act, Cap 116. The Energy Act, amongst other issues, deals with all matters relating to all forms of energy including the generation, transmission, distribution, supply and use of electrical energy as well as the legal basis for establishing the systems associated with these purposes.

The Energy Act, 2006, also established the Energy Regulatory Commission (ERC) whose mandate is to regulate all functions and players in the Energy sector. One of

the duties of the ERC is to ensure compliance with Environmental, Health and Safety Standards in the Energy Sector, as empowered by Section 98 of the Energy Act, 2006. In this respect, the following environmental issues will be considered before approval is granted:

- ✓ The need to protect and manage the environment, and conserve natural resources;
- ✓ The ability to operate in a manner designated to protect the health and safety of the project employees; the local and other potentially affected communities.

Licensing and authorization to generate and transmit electrical power must be supported by an Environmental Impact Assessment Report (EIA) approved by NEMA. Part IV Section 80(1) provides that a person shall not conduct a business of importation, refining, exportation, whole sale, retail, storage or transportation of petroleum, except under and in accordance with the terms and conditions of a valid licence.

Part IV Section 90 (1) stipulates that a person intending to construct a pipeline, refinery, bulk storage facility or retail dispensing site shall before commencing such construction, apply in writing to the Energy Regulatory commission for a permit to do so. The application shall: specify the name and address of the proposed owner; be accompanied by three (3) copies of plans and specifications and be accompanied by an Environmental Impact Assessment (EIA) Report.

Part IV section 91(1) stipulates that the Energy Regulatory Commission shall, before issuing a permit under section 90, take into account all relevant factors including the relevant government policies and compliance with Environment Management and Coordination Act, 1999 and in particular EIA report as per Impact Assessment and Audit Regulations 2003, the Physical Planning Act, 1996 and the Local Government Act.

Part iv section 100 (1) provides that it is an offence if a person being the owner or operator of a refinery, pipeline, bulk liquefied Petroleum gas or natural gas facility, service station, filling station or storage depot, fails to institute appropriate environmental, health or safety control measures. The offence if convicted, he/she shall be liable to a fine not exceeding two million shillings or to a maximum term of imprisonment of two years, or to both.

3.3.7 National Land Commission Act, 2012

There are new land laws governing the management and administration of land in Kenya. The Ministry of Lands had hitherto spearheaded the formulation of land bills which were debated on by various stakeholders, passed by Parliament and assented to into law by H. E. the President of the Republic of Kenya on the 27th April 2012.

The **National Land Commission Act, 2012** *is a*n Act of Parliament to make further provisions as to the functions and powers of the National Land Commission, qualifications and procedures for appointments to the Commission; to give effect to the objects and principles of devolved government in land management and administration, and for connected purposes.

Under Articles 62(2) and (3) of the Constitution, the Commission has power to administer public land on behalf of the national government and county governments.

3.3.8 Land Registration Act, 2012

The **Land Registration Act, 2012** is an Act of Parliament to revise, consolidate and rationalize the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes. This Act repeals; The Indian Transfer of Property Act 1882, The Government Lands Act, (Cap 280), The Registration of Titles Act, (Cap 281), The Land Titles Act, (Cap 282) and The Registered Land Act (Cap 300).

3.3.1 The Land Act, 2012 No.6 0f 2012

The **Land Act, 2012** is Act of Parliament to give effect to Article 68 of the constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land based resources, and for connected purposes. This Act repeals; The Wayleaves Act, Cap 292 and The Land Acquisition Act, Cap 295.

The *Land Act, 2012* and the *Land Registration Act, 2012* make major changes to the substantive and procedural law respectively relating to land in Kenya. The two statutes have a major impact on contracts relating to land, charges, transfers and leases. There are changes to the law on creation of charges over land and the realization of such charges.

Section 3(1) of the *Land Act, 2012* provides that the Act shall apply to all land declared as:

- ✓ Public land under Article 62 of the Constitution;
- ✓ Private land under Article 64 of the Constitution; and
- ✓ Community land under Article 63 of the Constitution and any other written law relating to community land.

Section 4 sets out values and principles of land management and administration which are binding on and are to be adhered to by all state organs, state officers, public officers

and all persons whenever any of them enacts, applies or interprets any provisions of the LA or makes or implements public policy decisions. These values and principles are:

- ✓ Equitable access to land;
- ✓ Security of land rights;
- ✓ Sustainable and productive management of land resources;
- ✓ Transparent and cost effective administration of land;
- ✓ Conservation and protection of ecologically sensitive areas;
- ✓ Elimination of gender discrimination in law, customs and practices related to land and property in land;
- ✓ Encouragement of communities to settle land disputes through recognized local community initiatives;
- ✓ Participation, accountability and democratic decision making within communities, the public and the Government;
- ✓ Technical and financial sustainability;
- ✓ Affording equal opportunities to members of all ethnic groups;
- ✓ Non-discrimination and protection of the marginalized;
- ✓ Democracy, inclusiveness and participation of the people; and
- ✓ Alternative dispute resolution mechanisms in land dispute handling and management.

In section 5, the Land Act 2012 recognizes the following forms of land tenure:

- ✓ Freehold;
- ✓ Leasehold;
- ✓ Such forms of partial interest as may be defined in the Act or other law, including but not limited to easements; and
- ✓ Customary land rights, where consistent with the Constitution.

Section 7 provides that title to land may be acquired through:

- ✓ Allocation (—allocation is vaguely defined in section 2 as —the legal process of granting rights to land);
- ✓ Land adjudication process;
- ✓ Compulsory acquisition;
- ✓ Prescription;
- ✓ Settlement programs;
- ✓ Transmissions;
- ✓ Transfers;
- ✓ Long term leases exceeding twenty one years created out of private land; or
- ✓ Any other manner prescribed in an Act of Parliament.

Thus where land is to be acquired, full compensation shall be paid promptly to all persons affected along the following parameters:

- ✓ Area of land acquired;
- ✓ Property value after valuation by the Land Commission
- ✓ Amount of the compensation payable;
- ✓ Market value of the property;
- ✓ Damages sustained from the severance of the land parcel from the land;
- ✓ Damages to other property in the process of acquiring the said land parcel;
- ✓ Consequences of changing residence or place of business by the land owners; and
- ✓ Damages from diminution of profits of the land acquired.

Subject to and in accordance with section 143 (1) and section 146, the Commission may, create a right of way which shall be known as public right of way.

144.(1) Unless the Commission is proposing on its own motion to create a wayleave, an application, for the creation of a wayleave , shall be made by any State department, or the county government, or public authority or corporate body, to the Commission.

(2) An application shall be made in the prescribed form and shall be accompanied by any prescribed information or other information that the Commission may, in writing require the applicant to supply and the Commission shall not begin the process of creating a wayleave until all prescribed or required information has been submitted to it.

Under section 110 (1) of Land Acts 2012 No.6 of 2012 land may be acquired compulsorily under this Part if the Commission certifies, in writing, that the land is required for public purposes or in the public interest as related to and necessary for fulfillment of the stated public purpose.

Part 2 of this section states that if, after land has been compulsorily acquired the public purpose or interest justifying the compulsory acquisition fails or ceases, the Commission may offer the original owners or their successors in title pre-emptive rights to re-acquire the land, upon restitution to the acquiring authority the full amount paid as compensation.

Section 111 (1) states that if land is acquired compulsorily under this Act, just compensation shall be paid promptly in full to all persons whose interests in the land have been determined. The commission shall make rules to regulate the assessment of just compensation.

Likewise where land is acquired compulsorily, full compensation shall be paid promptly to all persons affected in accordance to section 113 (1). (2) Subject to Article 40 (2) of the Constitution and section 122 and 128 of this Act, an award—

(a) Shall be final and conclusive evidence of—

- ✓ The size of the land to be acquired;
- ✓ The value, in the opinion of the Commission, of the land;
- ✓ The amount of the compensation payable, whether the persons interested in the land have or have not appeared at the inquiry; and

Under Section 148 and subject to the provisions of this section, compensation shall be payable to any person for the use of land, of which the person is in lawful or actual occupation, as a communal right of way and, with respect to a wayleave, in addition to any compensation for the use of land for any damage suffered in respect of trees crops and buildings as shall, in cases of private land, be based on the value of the land as determined by a qualified valuer.

Sub-section 2 states that Compensation relating to a wayleave or communal right of way shall not be paid to a public body unless there is a demonstrable interference of the use of the land by that public body.

Damage caused as a result of the creation of a wayleave shall include any preliminary work undertaken in connection with surveying or determining the route of that wayleave, and whether the trees, crops or buildings so damaged were included in the route of the wayleave as delineated in the order of the Cabinet Secretary.

The duty to pay compensation payable under this section shall lie with the State Department, county government, public authority or corporate body that applied for the public right of way and that duty shall be complied with promptly. This provision will guide land acquisition where necessary.

3.3.2 The Kenya Roads Act Of 2007

The Act stipulates the legal and institutional aspects of the road sub-sector policy. The Act provides for the establishment of three independent Road Authorities, namely: (i) Kenya National Highways Authority (KeNHA), responsible for the administration, control, development and maintenance of all class A, B and C roads in Kenya, (ii) Kenya Rural Roads Authority (KeRRA), responsible for rural and small town roads including class D, E roads and Special Purpose Roads and (iii) Kenya Urban Roads Authority (KURA) responsible for all City and Municipal Roads. The Authorities fall

under the Ministry of Roads, which will retain the role of policy formulation, and general oversight of public roads including regulatory aspects such as technical standards.

Section 22 of the Act details the procedure for acquisition of any land required by an authority for the purposes of its functions under this Act.

The access road in question is not classified but could easily fall under Special Purpose roads. It is however the duty of the proponent rather than the KeRRA to provide alternative access to the residents.

The Kenya National Highways Authority (KeNHA), a parastatals currently in category PC 3A was set up under the Roads Act, 2007 and charged with the mandate to manage, develop, rehabilitate and maintain national roads and is an equal opportunity employer. The project will have to liaise with the KeNHA where pipeline has to cross or utilize road reserve on the B1 and A104 roads – procure the specified licenses.

3.3.3 The Forest Act, 2005

Section 40 (1) states that:

"Where the Board is satisfied that utilization of a forest can be done through the granting of concessions, the Service may, by license, grant the same subject to an Environmental Impact Assessment License in accordance with the Environmental Management and Co-ordination Act, 1999."

Further, it states in Section 40 (2) that:

"the grantee of a concession shall –

(a) Comply with the guidelines or management plans prescribed by the Service;

(b) Protect the concession area from destruction and encroachment by other persons;

(c) Ensure that the forest areas under his management are maintained for the conservation of biodiversity, cultural or recreational use;

(d) Maintain the physical boundaries of the concession;

(e) Take precautions to prevent the occurrence and spread of forest fires in connection with any or all operations within or outside the concession area; ensure that all structures and facilities constructed or operated by and in connection with any activities are maintained according to the conditions of the license;"

Section 40 (4) of the Act states that:

"The Board may withdraw a concession granted under this section where a grantee breaches any of the conditions prescribed under subsection (2')"

3.3.4 The Wildlife Act

The Wildlife Bill, 2011 Part VIII, on Protection of Endangered and Threatened Ecosystems and Species, on Endangered and threatened ecosystems spells out the need and the means to safeguarding endangered species as follows: -

- ✓ 53-Protection of endangered and threatened ecosystems
- ✓ 54-Listing of endangered and threatened species
- ✓ 55-Restricted activities involving listed species
- ✓ 56-Recovery plans
- ✓ 57-Control of invasive species

The **Wildlife Bill** Section 53 (1), Contains in the Fifth Schedule, provision for Listing of endangered and threatened species and gives provision for listing of Invasive Species under Section 56.

Some wetlands/lakes are designated as internationally important under the Convention on Wetlands (Ramsar, 1971). These wetlands are commonly known as Ramsar Sites. Lake Elementaita, Lake Nakuru and Lake Naivasha are such Ramsar sites.

Similarly, Lake Elementaita, Lake Nakuru and Lake Bogoria are important World Heritage Sites. These are forming part of the cultural and natural heritage which the World Heritage Committee considers as having outstanding universal value.

Other existing aquatic environmental values include:

- ✓ Riverine habitats are primarily ephemeral and characterized by a uniform channel with a sandy/gravel substrate and little in-stream habitat. Due to their ephemeral nature, low abundance of habitat features and degradation from cattle and weeds, these rivers generally provide low value habitat for aquatic fauna.
- ✓ Aquatic habitats within the study area provide habitat for a range of generalist fauna and flora species.
- ✓ Due to these characteristics, the following need to be safeguarded in these habitats:
- ✓ Threat of invasive species from construction of the Project.

Existing balance so that these habitats continue to give the value of:

- ✓ Support for vulnerable, endangered or critically endangered species or threatened ecological communities.
- ✓ Support for populations of plant and/ or animal species important for maintaining the biological diversity of a particular biogeographic region.
- ✓ Support for populations of plant and/ or animal species important for maintaining the biological diversity of a particular biogeographic region.

o) Conservation of Biological Diversity Regulations, 2006

Part II of this regulation states that a person may not engage in any activity that may have an adverse impact in the environment without conducting an Environmental Impact Assessment.

The Environmental Management and Co-Ordination (Conservation of Biological Diversity and Resources, Access To Genetic Resources And Benefit Sharing) Regulations, 2006, Part II Conservation of Biological Diversity stipulates as follows:-

4. Environmental Impact Assessment License.

(1) A person shall not engage in any activity that may-

(a) Have an adverse impact on any ecosystem;

(b) Lead to the introduction of any exotic species;

(c) Lead to unsustainable use of natural resources, without an Environmental Impact Assessment License issued by the Authority under the Act.

3.3.5 Urban Areas and Cities Act No. 13 0f 2011

The Act is an Act of Parliament to give effect to Article 184 of the Constitution; to provide for the, classification, governance and management of urban areas and cities; to provide for the criteria of establishing urban areas, to provide for the principle of governance and participation of residents and for connected purposes.

The implementation of the recently enacted Urban Areas and Cities Act 2011 may pose serious challenges once county governments are in place. While the Act purports to implement provisions of article 184 of the Constitution, its full implementation has the effect of divesting county government functions and allocating them to boards of cities, municipalities and towns created under the Act.

The differences in the service delivery needs of rural and urban areas, as well as the difference in revenue capacities, justify a different approach as envisaged by the Act.

3.3.6 The Employment Act (No 1 Of 2007)

States on restriction in employing child of between thirteen and sixteen years of age to attend machinery,

Section 58 (1) No person shall employ a child of between thirteen and sixteen years of age, other than one serving under a contract of apprenticeship or indentured learnership in accordance with the provisions of the Industrial Training Act, in an industrial undertaking to attend to machinery.

(2) No person shall employ a child in any opencast workings or sub-surface workings that are entered by means of a shaft or adit.

3.3.7 HIV/AIDS Prevention and Control Act No. 14 Of 2006

The law prohibits various forms of sexual violence offences committed against men and women. These include rape, attempted rape, sexual assault, indecent acts, defilement, gang rapes, sexual harassment, child pornography, child prostitution, child sex tourism, exploitation of prostitution, incest, deliberate transmission of HIV and AIDS including other life threatening sexually transmitted diseases, and cultural and religious offences.

According to section 4 (1) the Government shall promote public awareness about the causes, modes of transmission, consequences, means of prevention and control of HIV and AIDS through a comprehensive nationwide educational and information campaign conducted by the Government through its various Ministries, Departments, authorities and other agencies. Pursuant to subsection (2), the educational and information campaign referred to in subsection (1) shall-

(a) Employ scientifically proven approaches;

(b) Focus on the family as the basic social unit;

(c) Encourage testing of individuals; and

(d) be carried out in schools and other institutions of learning, all prisons, remand homes and other places of confinement, amongst the disciplined forces, at all places of work and in all communities throughout Kenya.

Subsection (3) provides that in conducting the educational and information campaign referred to in this section, the Government shall collaborate with relevant stakeholders to ensure the involvement and participation of individuals and groups infected and affected by HIV and AIDS, including persons with disabilities.

Section 31 (1) provides that, no person shall be-

(a) Denied access to any employment for which he is qualified; or

(b) Transferred, denied promotion or have his employment terminated, on the ground only of his actual, or suspected HIV status.

RVWSB will endeavor to promote educational and informational campaigns and organize for Voluntary Counselling and Testing throughout the project cycle. In addition, the proponent shall ensure that the contractors do not discriminate workers on the basis of their HIV status.

3.3.8 Physical Planning Act (Cap 286),

Under the Physical Planning Act (CAP 286), physical development activities are supposed to be carried out according to the physical plans. Accordingly the processes of physical planning involve two stages; the plan making stage and the development control stage. The former involves drawing up the actual plan to indicate the various

activities and zones whereas the later involves the process of determining applications by developers to carry out specific development activities. The planning of human settlements along the pipeline route requires enforcement of pipeline reserve standards, especially the width among others. These issues should be taken into account in the design of the project.

3.3.9 Companies Act (Cap 486)

The Kenya Pipeline Company was incorporated on 6th September 1973 under the companies act (Cap 486) and started commercial operations in 1978. The Company is a State Corporation under the Ministry of Energy with 100% government shareholding. The company operations are also governed by relevant legislations and regulations such as; the Finance Act, The Public Procurement Regulations, amongst others. Kenya Pipeline Company operates a pipeline system for transportation of refined petroleum products from Mombasa to Nairobi and western Kenya towns of Nakuru, Kisumu and Eldoret. In collaboration with the Government, KPC facilitates the implementation of Government policies. The Itare Dam Water Supply Project proponent will have to liaise with Kenya Pipeline Company for any necessary permits regarding sections where the water pipeline crosses the oil pipeline.

3.3.10 Kenya Railways Corporation Act (Cap 397)

The ***Kenya Railways Corporation Act (Cap 397)*** highlights the various roles of the Kenya Railways Corporation in the provision of inland railway systems. The Kenya Railways Corporation ("KR" or "KRC"), is a State Corporation established under this Act. The corporation is mandated to develop railway networks in the country and to provide freight and passenger services either directly or through third parties.

There is possibility of interaction between proposed project components and Kenya Railways assets during project implementation, which issues must be resolved without adversely affecting KR's mandate.

3.3.11 National Museums and Heritage Act 2006

The *National Museums and Heritage Act 2006* gives provision for an area of land of cultural significance to be set-aside or acquired under compulsory provision and declared a protected area under Sections 34 and 35 of the Act. This provides for the gazettement of national monuments. Monuments gazetted under this Act fall under the management of the National Museums of Kenya. Several of these monuments include forests of cultural and biodiversity significance.

The Act consolidates the law relating to national museums and heritage; to provide for the establishment control, management and development of national museums and the identification, protection, conservation and transmission of the cultural and natural heritage of Kenya. It was set up in order to repeal the Antiquities and Monuments Act and the National Museums Act; and for connected purposes.

Among other definitions, under this Act, "cultural heritage" means— works of humanity or the combined works of nature and humanity, and areas including archaeological sites which are of outstanding value from the historical, aesthetic, ethnological or anthropological point of view;

The proponent will therefore ensure that the proposed project doesn't fall within sacred sites, ruins, caves or areas of national significance before construction and if items of such value are encountered during project implementations, due process to surrender them to relevant authorizes will be followed.

3.3.12 Constitution of Kenya

The *Constitution of Kenya,* Chapter Two on the Republic, Section 11 on Culture

11. (1) This Constitution recognizes culture as the foundation of the nation and as the cumulative civilization of the Kenyan people and nation.

(2) The State shall—

(a) promote all forms of national and cultural expression through literature, the arts, traditional celebrations, science, communication, information, mass media, publications, libraries and other cultural heritage;

(b) Recognize the role of science and indigenous technologies in the development of the nation; and

(c) Promote the intellectual property rights of the people of Kenya.

(3) Parliament shall enact legislation to—

(a) Ensure that communities receive compensation or royalties for the use of their cultures and cultural heritage; and

(b) Recognize and protect the ownership of indigenous seeds and plant varieties, their genetic and diverse characteristics and their use by the communities of Kenya.

3.4 Institutional Structure of the Water Sector

The National Policy on Water Resources Management and Development and the Water Act 2002, presently guides water resources management. The overall goal of the national water development policy is to facilitate the provision of water in sufficient

quantity and quality and within a reasonable distance to meet all competing uses in a sustainable, rational and economical way. This policy separates policy formulation, regulation and services provision and defines clear roles for sector actors within a decentralized institutional framework and includes private sector participation and increased community development.

Under the policy, the Ministry of Environment, Water and Natural Resources is responsible for policy development, sector co-ordination, monitoring and supervision to ensure effective Water and Sewerage Services in the Country, sustainability of Water Resources and development of Water resources for irrigation, commercial, industrial, power generation and other uses. The MWI executes its mandate through the following sector institutions:

3.4.1 Water Services Regulatory Board (WASREB)

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

(i) Regulating the provision of water and sewerage services including licensing, quality assurance, and issuance of guidelines for tariffs, prices and disputes resolution.
(ii) Overseeing the implementation of policies and strategies relating to provision of water services licensing of Water Services Boards and approving their appointed Water Services Providers,
(iii) Monitoring the performance of the Water Services Boards and Water Services Providers,
(iv) Establish the procedure of customer complaints,
(v) Inform the public on the sector performance,
(vi) Gives advice to the Minister in charge of water affairs.

3.4.2 Water Resources Management Authority (WRMA)

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

(i) Implementation of policies and strategies relating to management of Water resources
(ii) Develop principles, guidelines and procedures for the allocation of water,
(iii) Development of Catchments level management strategies including appointment of catchments area advisory committees,

(iv) Regulate and protect water resources quality from adverse impacts,
(v) Classify, monitor and allocate water resources.

3.4.3 Water Services Trust Fund (WSTF)

This body assists in the financing of the provision of Water Services to areas of Kenya, which are without adequate water services. This shall include providing financing support to improved water services towards;

(i) Capital investment to community water schemes in underserved areas
(ii) Capacity building activities and initiative among communities
(iii) Water services activities outlined in the Water Services Strategic Plan as prioritized by the Government
(iv) Awareness creation and information dissemination regarding community management of water services
(v) Active community participation in the management of water services

3.4.4 Water Services Boards (WSBs)

The WSBs are responsible for the efficient and economical provision of water and sewerage services in their areas of jurisdiction. CWSB is among the seven catchment Boards established under the Act mandated to;
(i) Develop the facilities, prepare business plans and performance targets
(ii) Planning for efficient and economical provision of Water and sewerage services within their areas of jurisdiction;
(iii) Appointing and contracting Water Service Provider
(iv) Asset holding of Central Government facilities

3.4.5 Water Services Providers

Water Service Providers are the utilities or water companies. They are state owned but have been commercialized to improve performance and run like business within a context of efficiency, operational and financial autonomy, accountability and strategic, but minor investment.

3.5 NEMA Compliance

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

3.6 Sectoral Integration

This integration encourages provision of sustainable development and a healthy environment to all Kenyans. The key functions of NEMA through the NEC include policy direction, setting national goals and objectives and determining policies and priorities for the protection of the environment, promotion of cooperation among public departments, local authorities, private sector, non-governmental organizations and such other organizations engaged in environmental protection programs and performing such other functions as contained in the act.

Other stakeholder authorities include Ministries of Water Resources and Irrigation, Agriculture, Environment and Natural Resources, Tourism and Wildlife, Lands and Settlement, Social and Cultural Services, Livestock as well as the Provincial Administration. The Kenya Wildlife Services is perhaps the ultimate authority over the wildlife management and works closely with the communities in respect of interactions of wildlife and the operations of water works.

3.6.1 Project Institutional Management Structure

The proposed Project would be implemented the RVWSB

a) RVWSB

RVWSB will take the lead on execution of project activities (including preparation of tender and design documents, technical supervision of works, and contract management as well as planning, coordination and reporting for all project activities. Some of the relevant RVWSB activities will be to:

- ✓ Provide an Environmental and Social Liaison Officer
- ✓ Maintain supervision services on the ESMP generated in this report.
- ✓ Conduct annual environmental audits
- ✓ Keep up to-date records of all happenings of an environmental nature

b) Supervising Consulting Firm

RVWSB will achieve these objectives through the appointed Supervising Consulting Firm who have the relevant national and international experience, H.P. Gauff Ingenieure GmbH & Co. KG.

The supervisor will ensure effective implementation of the ESMP. It is expected that the supervisor engages the services of an environmental expert who should in return understand the details of the recommendations on environment management and especially the proposed action plans, timeframes and expected targets of the ESMP.

The environmental supervisory expert should be the liaison person between the contractor and RVWSB on the implementation of environmental concerns as well as issues of social nature associated with the project.

c) The Contractor

The contractor will be required to establish an environmental office to continuously advise on environmental components of the project implementation. Elements in the environmental and social management plan are expected to be integrated in the project through the supervising environmental expert. The environmental officer of the contractor is also expected to full understand the engineering and management aspects of the project for effective coordination of relevant issues.

3.7 International Conventions

3.7.1 The Kyoto Protocol (Air Quality)

Environmental values have not been set in relation to greenhouse gas emissions. Kenya is signatory to the Kyoto Protocol. This protocol is applicable to air quality.

3.7.2 International Agreements and Treaties (Water Resources)

These treaties relate to the consumptive utilization of waters of Lake Victoria and the Nile Drainage System

The Lake Victoria basin contributes about 20 to 25% of water flowing in the Nile north of Khartoum, while 75 to 80% is contributed by catchments in Ethiopia. The Itare catchment area forms less than 1% of the Lake Victoria drainage basin.

There are eleven treaties dealing with the consumptive use of the waters of the Nile and Lake Victoria Five treaties were signed before World War I while six treaties were signed after World War I.

These treaties are outlined below and comments made regarding their validity.

a) 1891 Agreement:

Italy and Great Britain signed a Protocol for the demarcation of their spheres of influence in Eastern Africa in Rome on 15 April 1891. Article III of the Protocol stipulates that "the Government of Italy undertakes not to construct on the Atbara River any irrigation, or other work which might sensibly modify its flow into the Nile."

This agreement, by its very nature expired with the end of the Italian and British Colonial rule in the region.

b) 1902 Agreement:

Ethiopia and Great Britain (for Sudan and Egypt) signed a treaty in Addis Ababa on 15 May 1902 regarding the frontiers between Anglo-Egyptian Sudan and Ethiopia/Eritrea. Emperor Menelik II, King of Ethiopia undertook not to construct any work across the Blue Nile, Lake Tana or the Sobat which would arrest the flow of their waters into the Nile except in agreement with His Britannic Majesty's Government and the Government of Sudan.

It can be assumed that this treaty expired with tile end of tile colonial era.

c) 1960(a) Agreement:

Great Britain and the independent State of the Congo signed an agreement in London in 9 May 1906 to re-define their sphere of influence in Central Africa Article 3 of the agreement provides as follows: "The Government of the Independent Slate of the Congo undertakes not to construct, or allow to be constructed, any work on or near the Semilili or Isango Rivers, which would diminish the volume of water entering Lake Albert, except in agreement with tile Sudanese Government."

This treaty also expired with the end of the colonial era.

d) 1906(b) Agreement:

A tripartite agreement between Great Britain, France and Italy was signed in London on 13 December 1906 safeguarding the interests of Great Britain and Egypt in the Nile Basin, more especially, the regulation of the waters of the Nile and its tributaries (due consideration being paid to tile local interests):

This agreement does not have validity beyond the colonial era,

e) 1925 Agreement:

Exchange of letters and notes were made between Great Britain and Italy in December 1925 as a follow up of the 1906(b) agreement. Italian Government, recognizing the prior hydraulic rights of Egypt and Sudan, undertook not to construct on the headwaters of the Blue Nile or White Nile, or tributaries, or effluents any work which might sensibly modify their now into the main river.

This agreement could not have been intended to be binding on Ethiopia or the Eastern Africa States.

Post-World War I Agreements

f) 1925 Agreement:

The first important agreement on the Nile waters in post-World War I period was concluded in 1929 between Egypt and Great Britain (acting for the Sudan and its

Eastern Africa dependencies). This agreement was done by exchange of notes in Cairo on 7 May 1929 and came into force the same day, It states: "No irrigation or power works or measures are to be constructed or taken on the River Nile and its branches, or on the lakes from which it flows, so far as these are in Sudan or in the countries under British administration, which would, in such a manner as to entail any prejudice to the interests of Egypt, either to reduce the quantity of water arriving in Egypt, or the date of its arrival, or lower its level".

This treaty has not been invoked in Kenya or Tanzania to restrain any irrigation or other consumptive uses of water. The treaty lapsed when Kenya and Tanzania ceased to be "territories under British administration" as stipulated in the agreement. The treaty ceased to have effect with respect to Kenya as from 12 December 1965.

g) 1949 Agreement:

The 1949 agreement concerns the construction of the Owen Falls Dam at Jinja in Uganda and was concluded by Great Britain (acting for Uganda) and Egypt by exchange of notes between the two governments. The purpose of the dam was to control tile flow of the waters of the Nile and to produce hydroelectric power for Uganda. The flow, which combines what goes through the turbines and what is allowed through the sluices, was to be supervised by Egyptian resident engineers at the dam. There has been an Egyptian resident engineer to monitor the water flow stationed at the Owen Falls Dam to date.

h) 1950 Agreement:

This agreement concerns co-operation between Egypt and Uganda in carrying out meteorological and hydrological surveys. It was done by exchange of notes between the Egyptian Ministry of Foreign Affairs and the British Ambassador in Cairo (for Uganda). The then Uganda authorities agreed to establish data collection posts to the extent that was marked on a map, but the number of posts could not be varied without prior consultation with the Egyptian Ministry of Works. Egypt would contribute towards the expenses incurred in maintenance of the posts within a certain monetary limit.

This agreement provided Egypt with meteorological and hydrological data of the East African states.

i) 1959 Agreement:

Egypt and Sudan signed the agreement for the "Full Utilization of the Nile Waters" in Cairo on 8 November 1959. "The full utilization of the Nile Waters for the benefit of the two republics required the implementation of projects for the full control of the river,

and the increase of its water supply, and the planning of new working agreements on lines different from those followed under the present condition.

Ethiopia, Kenya, Tanzania and Uganda were not consulted when this treaty for the full utilization of the Nile waters WGS drawn up.

j) 1960 Agreement:

Egypt and Sudan signed a Protocol on 17 January 1960 .is a follow up of the 1959 Agreement to form a permanent joint technical committee to supervise all the working arrangements in the 1959 Agreement as well as to carry out necessary hydrological studies to facilitate adequate policies. There was a stipulation in the Protocol that should there be a need to alter any aspect of it, and then it would be done by exchange of letters between the two parties.

This agreement was concluded between only two of the ten riparian States.

k) 1967 Agreement:

A plan of operation for a hydro-meteorological survey of Lake Victoria, Kyoga and Albert was signed by 5 countries, namely, Egypt, Kenya, Sudan, Tanzania and Uganda, as well as UNDP and the World Meteorological Organization (WMO) on different days in May 1967 and the project declared operational with effect from 17 August 1967. The purpose of the project was to evaluate the water balance of the Lake Victoria catchment in order to assist any control or regulation of the lake level as well as the flow of water down the Nile. The financial assistance came from the UNDP. WMO was the executing agency. As the project progressed, the five participants had consultations with Rwanda and Burundi to extend the project area to cover the Lake Victoria catchment in Rwanda and Burundi as well.

The first phase was completed in 1974 and this was followed by a second phase. The first report published in 1974 gave an analysis of the meteorology of the basin. The second phase was to work out mathematical models of the flows in and out of the lakes to facilitate their control.

l) Conclusion

Under the treaties outlined above, Kenya, Ethiopia and Tanzania are under no obligation regarding the use of the waters flowing to Lake Victoria and the Nile basins. It is clear that there has been no agreement on the utilization of the waters of Lake Victoria direction; involving all riparian States. All the riparian States may, however, be under limited obligation is only under general international law to permit the lower riparian States an equitable share of the water but then the exact modalities are subject to fresh negotiations.

A treaty to create a regulatory framework involving all the riparian States of the Lake Victoria and the Nile River system is required. The question is not one of re-negotiation of the on legal regime but one of a "clean-slate" negotiation because for the majority of the riparian States, there is no previously negotiated agreement which binds them. However, the Nile Basin Initiative (NBI) working group 1999 is in place working towards this goal and to provide recommendations to guide the stakeholders.

There is therefore, nothing in policy or law to stop Kenya from pursuing essential alternatives regarding the use of Lake Victoria basin waters to enhance agricultural productivity or to improve the living standards of her people.

3.7.3 United Nations Framework Convention on Climate Change (UNFCCC)

The Convention on Climate Change sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognizes that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases. The Convention enjoys near universal membership, with 191 countries having ratified.

Under the Convention, governments:

- ✓ Gather and share information on greenhouse gas emissions, national policies and best practices;
- ✓ Launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and
- ✓ Co-operate in preparing for adaptation to the impacts of climate change.

The Convention entered into force on 21 March 1994. The landmark UNFCCC was opened for signature at the 1992 United Nations Conference on Environment and Development (UNCED) Conference in Rio de Janeiro (known by its popular title, the Earth Summit). On June 12, 1992, 154 nations signed the UNFCCC that upon ratification committed signatories' governments to a voluntary "non-binding aim" to reduce atmospheric concentrations of greenhouse gases with the goal of "preventing dangerous anthropogenic interference with Earth's climate system." These actions were aimed primarily at industrialized countries, with the intention of stabilizing their emissions of greenhouse gases at 1990 levels by the year 2000; and other responsibilities would be incumbent upon all UNFCCC parties. The parties agreed in general that they would recognize "common but differentiated responsibilities," with greater responsibility for reducing greenhouse gas emissions in the near term on the

part of developed/industrialized countries, which were listed and identified in Annex I of the UNFCCC and thereafter referred to as "Annex I" countries.

Kenya signed the UNFCCC on 12th July 1992, ratified it on 30th August 1994 and started enforcing it on 28th November 1994.

It is recommended to study if the project has any significant contribution to climate change bearing in mind Kenya's commitment to the above convention.

Other legal provisions that will apply and have been introduced before include *the Wildlife bill 2012, Land Act 2012, National Land Commission Act 2012* among others.

3.7.4 Geneva Conventions on Proper Usage of Weapons of War

The international community banned the use of chemical and biological weapons after World War 1 and reinforced the ban in 1972 and 1993 by prohibiting the development, stockpiling and transfer of these weapons.

These conventions have banned use of chemical and biological weaponry against a civilian population. Poisoned waters can be a lethal weapon. Even governments that engage their subjects in such wars are liable to prosecution for crimes against humanity.

4 THE ENVIRONMENTAL BASELINE CONDITIONS

This section gives a description of the baseline data and potentially affected environment

4.1 Topography and Physiography

The main topographic features in the area are the Mau Escarpment covering the western part of the area, the Rift Valley floor, Menengai crater with its drainage and relief system and Lake Nakuru located on the floor of the Rift Valley.

Figure 4-1: Topography of the Nakuru county & boundaries – Mau Forest

4.2 Drainage and Hydrology

4.2.1 Drainage

Rivers in this region contribute to four major lakes in East Africa's vast area of inland drainage. The drainage system of the northern and eastern slope of the Mau Hills collect in the Enjoro, Rongai, Molo, Narasura and Maji Mazuri Rivers. They drain to the inland lakes on the floor of Rift Valley. Itare River on the western side of the area flows and eventually drains to Lake Victoria.

Itare river catchment forms a sub-catchment part of the Sondu-Miriu river catchment which is one of the six major rivers in the Lake Victoria basin, draining a total area of 3,470 km^2 in the Western part of Kenya from the slopes of the Mau Escarpment into Lake Victoria (Kenya portion).

The Sondu-Miriu River catchment is characterized by diverse land use types and developments including forestry, large-scale and small-scale agriculture, urban and suburban settlements, agro-based industries and hydroelectric power generation. Because of the combined effects of these human activities, and the increase in their scale and intensity over the years, they impose multiple threats to water quality, aquatic biodiversity and the general ecology of the river, including flood peaks and low flows.

Forest excisions, the latest in 2001, and the subsequent conversion to agricultural use have significantly reduced Mau Forest Complex forest cover. Especially in much of the upper parts of it which encompasses the Itare River catchment where between 1986 and 2009 more than 20% of forest cover was lost to agriculture. The impact of this on the Itare river hydrology was surprisingly small as evident in monitoring reports.

The proposed Itare dam site is located in Kuresoi Constituency, Kuresoi District and will affect people in Kiptororo and Tinet locations in the Keringet area of Nakuru District. It was said to be located (MIBP & Partners, 1998), exactly at 35º 31' 41" east and 0º 29' 24" south at an altitude of 2365 masl and to have a catchment area of about 217 km^2.

4.2.2 Hydrology

d) Itare Dam Site

Itare river catchment forms a sub-catchment part of the Sondu-Miriu river catchment which is one of the six major rivers in the Lake Victoria basin, draining a total area of 3,470 km in the Western part of Kenya from the slopes of the Mau Escarpment into Lake Victoria (Kenya portion). Itare River emanates from the confluence of three rives namely, Sondu, Songoon and Ndoinet Rives. It flow south west direction until it confluence with other rivers to form Sondu-Miriu River.

The proposed Itare dam site is located in Kuresoi Constituency, Nakuru County and will affect people in Kiptororo and Tinet locations in the Keringet area. It is located at

35º 31'41" east and 0º 29' 24" south at an altitude of 2365 masl and to have a catchment area of about 210 km^2 as shown in Figure 4-1.

The Itare Dam site is within the South West Mau Forest which is an indigenous tropical upland forest with bamboo thickets, grassland glades and softwood plantations. The vegetation is characterized by high altitude plant species such as *Hagenia, Arundinaria, Helichrysum,* and *Philipia*. The Itare Dam site is predominated by grassland glades on both banks and a plantation zone at the shoulders of the valley.

The proposed Itare dam site is utilized by the indigenous Ogiek and Dorobo communities of South West Mau Forest who are now living at Chepkoburot village. The Ogiek and Dorobo are indigenous communities who have inhabited the South West Mau Forest for a long time, living by hunting, honey collection and cattle grazing. The Ogiek have only recently been involved in Socio-economic and land-use changes which have taken place in the Nakuru region.

Figure 4-2: Itare Dam Catchment Site

The Chepkoburot village in Ndoinet Forest where the Ogiek are living is a transitional facility while they await permanent resettlement by the Government. The community is already transforming to other modes of livelihood including cultivation. Some of them own cattle which graze in the open glades around the Itare Dam site. Some part of the forest has been converted into the Tinet/Kaongoi settlement scheme and most families have titles to the land.

Itare dam is the most favorable site in terms of its potential for medium and long term water supply to Nakuru town.

4.3 Forests Resources

a) South West Mau Forest

The South Western Mau Forest adjoins the Trans Mara Forest which lies to its south. Together with the Eastern Mau, the western Mau and Ol Pusimoru, they represent the largest remaining near contiguous tract of montane indigenous forest in Eastern Africa, totaling over 290,000ha.

Commercial logging in the Mau forests began in the early 1990s. However much of the degradation has been attributed to non-local people who arrived in the 70s and 80s and exploited the forests for fuelwood/charcoal and building materials, and also to concessionary timber felling. Clarke, 1992 states that "almost nowhere is there any primary forest, and all the closed canopy forest of the South western Mau forest has been logged at least once." Today the only commercial species of importance are *Albizia gummifera* and *Polysolas kikuyuensis.*

Despite the fact that the Mau Forest complex is not entirely pristine, there are nonetheless many reasons to support the conservation of these forests. The hydrological importance of the Mau Forest complex cannot be understated. It provides the water catchment area for three major drainage systems in western Kenya; the Sondu system (includes Itare and Kipsonoi rivers), the Mara system and Ewaso Ng'iro system.

The Sondu river system supplies the highly populated agricultural areas in western Kenya while the Mara River is the only permanent water source in the famous Maasai Mara National Park and the northern part of Serengeti National Park. Sondu river drains into lake Victoria while Ewaso Ng'iro drains into Lake Natron in Northern Tanzania. The most important breeding site of the lesser Flamingo *phoenicopterus minor*. The Mau forest also contribute to limiting stream flow, regulating flow differentials (thereby minimizing the occurrence of floods) maintaining water tables during dry spells, and preventing erosion.

The variety of montane forest habitats within the Mau Forest Complex (moist montane forest, montane sclerophyll forest, high mountain bamboo thicket and grassland) result in an area rich in bio-diversity. The Kenya Indigenous Forest Conservation Programme undertook, a number of studies/inventories in 1991-1992 which describe the biotic communities within the forests. The Bongo *Tragelaphus euryceros*, Yellow-backed

Duiker *Cephalophus syliviltor*, Golden Cat *Profelis aurata*, Giant Forest Hog *Hylochoerus meinertzhageni*, Leopard *Panthera pardus* and Elephant Loxodonta africana are cited as rare or endangered species living in the South Western Mau and Trans Mara Forests. More than 170 species of birds have been recorded. One species of orchid *Polystachya eurygnatha* is endemic to the South Western Mau, and the only known locality of the shrub *Chionanthus mildbraedii* is in the Mau Forest Complex.

For more than a century, the hunter-gatherer Ogiek tribes have lived within the Mau forests. These people are entirely dependent on the forests for food, grazing, rituals, medicine, etc. More recently, some communities have settled on the boundaries of the forests (forest adjacent households). As these populations grow and the demand for forest resources increases, use of these resources will become less sustainable.

b) Londiani Forest (Tunnel-Eastern Mau)

There are forest resources, both indigenous and exotic trees, in Londiani and Mau Forest in the eastern part of Kericho District. The total area covered by forests is 79,811 ha. This is gazetted land. About 64,873 hectares are protected. The current productive plantations total 14,937.11 ha. The remaining area of the district is settled land / farmlands, characterized by patches of woodlots and boundary line trees.

The Mau Forests are natural forests, while the Londiani and Tinderet area are both plantations and natural forests. The plantations are owned by Government, Tea estates and Kenya Posts and Telecommunication Corporation. The major exotic trees found in the district are Indian ash, maciritius thorn, Casuarina, cypress, blue gum, Mexican green ash, grevillea and black wattle. The indigenous trees consist of acacias, cotton species, Nandi flame, red stink wood, fig and cape ash.

Wood from these forests is mainly used for timber, building poles, fuel wood, power and telephone poles. Forests also provide the necessary soil cover which prevents soil erosion. Apart from these uses, the forests have the potential for other forest products such as bee-keeping, rubber tree planting, resin harvesting and silk tree rearing. Tree nurseries established purely for commercial purposes act as a source of income. Over 95% per cent of the rural population use fuel wood as a source of energy

c) Ndoinet area

The landscape of the Ndoinet area is very attractive, with spectacular ridges, the river valley itself, and the contrasting areas of settled land and paddy. Although few tourists

visit the region surrounding the dam, the landscape as well as the wildlife offers a potential resource for tourism development.

4.4 Water Resources

The current legal instrument is The Water Act, 2002, No. 8 of 2002. Attempts to acquire information on upstream water rights and abstractions from the WRMA office (Regional Office, Lake Victoria South Catchment Area (LVSCA) proved somewhat time-consuming so that the Client was requested to intercede or behalf of the consultant. It should however be noted that agricultural water rights are from wet weather flow and can be varied or suspended during a drought period upon Gazetting of such. However, without adequate policing, this restriction is more often flouted than obeyed.

Once the possible impact of any existing upstream water rights upon the Itare Dam Project is established, recommendations will be made as to any need or desirability for any actions under the relevant clauses of The Act.

4.5 Biodiversity

Lake Nakuru is located in the Eastern Rift Valley. Lake Nakuru National Park is the second most visited protected area in Kenya (Figure 4-2). It hosts the world's largest concentration of flamingos, as well as many of the animal species that make Kenya a highly valued tourism destination, including lions, leopards, rhinoceros, and water buffalo. In its total area of 188 km² there are over 450 bird species and 56 mammal species. Recognized as a wetland of international importance, Lake Nakuru was declared a Ramsar Site in 1990. The area of the lake and its adjacent park is secured by a fence. The National Park's terrestrial area serves as the buffer.

Figure 4-3: Flamingoes in Lake Nakuru

The threat of land cover degradation in the catchments of the lake is likely to increase flow fluctuation and decrease water quality. These images show the land cover degradation in the lake's catchment between 1973 and 2000.

In 2001, the Government of Kenya announced its intention to excise 353 km² of forest in the Eastern Mau Forest Reserve. As a result, most of the forest cover in the upper catchment of the main rivers that feed Lake Nakuru may disappear.

4.5.1 Flora

The proposed project site is within these zones which are characterized with cultivated vegetation interspersed with natural vegetation along the B1 and A1 Road network and rural areas. The proposed project scope will affect roadside and farmland vegetation but within a scope that allows for natural re-vegetation.

The vegetation around the dam site is mainly planted vegetation on farmlands and few indigenous trees near the river. Nearly 35 km of the bulk transmission pipeline will transverse a section of Mau Forest which is characterised which thick indigenous vegetation. The typical tree species found in Mau Forest include Cedar, Podo, Olive and Bamboo tress. The Molo, Elburgon area has similar vegetation cover as the dam site.

The Nakuru and Salgaa areas has vegetation which is mainly wooded and bushy grassland with a wide ecological diversity and characteristic habitats that range from the lake waters to the escarpment and ridges. The area is predominantly agricultural area with maize, wheat and other cash crops being planted.
The following is a discussion of plant species encountered at the project sites.

Figure 4-4: (a) Acacia Abyssinica Branan, (b and c) Oncoba spinosa Forsk

The *Acacia Abyssinica Branan*, in vernacular languages is Mugaa (Kik) Sirtuet (Kip) this is the most populous and dominant tree species the around the dam site. The tree

is 6-20 m high, with a crown flat, grey-brown bark, spines in pairs at nodes, flowers in heads white with fruits in grey or brown pods.

- **Ecology:** Wooded grasslands and forest edges.
- **Uses:** Firewood, charcoal, bee forage, nitrogen fixer and browse plant for large ungulates, good habitat for birds.

The *Oncoba spinosa Forsk* , locally Tungurwet in Kipsigis is a tree or shrub of 4-9 m high, much branched, smooth light grey to brown bark. It branches with axillary straight spines, with white or pink flowers. The fruits are shiny red-brown globose.

- **Ecology:** Riverine forest or bushland.
- **Uses:** The wood is used in furniture making and fruit is edible by both human, apes and birds.

Figure 4-5: (a)the Buddleia polystachya Fres and (b) Pennisetum clandestinum (c) Digitaria scalarum

The ***Buddleia polystachya*** Fres or Choronet in Nandi is a shrub or tree that grows to 6 m high. It is erect or struggling with pale brown bark. The leaves are ovate or elliptic, flowers are orange or purple and fruits are ellipsoid.

- **Ecology:** Montane forest and bushland.
- **Used:** By the inhabitants for edge and boundaries, for bee forage and firewood.
- It is present but not common at the dam site.

The ***Pennisetum clandestinum,*** local name: Kikuyu grass is a low closely matting perennial grass with numerous creeping rhizomes and stolons with short internodes, rooting at the nodes. Flowering stems are not of usual appearance in grass; they are very short 2-15cm long.

- **Ecology:** Highland forest regions on fertile soil.
- **Uses:** Is of recognized value as pasture, it thrives under heavy grazing. (Also used in lawns)

The ***Digitaria scalarum,*** African couch grass or thangari in Kikuyu is a perennial with long underground creeping stems. The flowering stem is slender, rarely higher than 30

cm; leaves are flat hairless or usually dark green hairy. The panicle is small, slender, and spike-like.

- **Ecology:** Widely distributed in the relatively moist regions of Kenya from sea-level to 2200m.
- **Uses:** Palatable grass readily eaten by livestock. Weed of arable land on account of its extensive underground stem which makes eradication difficult.

Figure 4-6 Pennisetum schimperi A. Rich**.**

Wire grass

- Densely tufted perennial 45-120cm high with leaves crowded near at the base. Stems slender moderately stout. Leaves up to 30cm, hard, green below, bluish-white. Inflorescence a cylindrical spike.
- **Ecology:** Occurs in the highland grasslands.
- **Uses:** Valueless grass for grazing, very good soil binder.

Figure 4-7: Clutia abyssinica Jaub & Spach

Kibanyat (Kip)

- Shrub 1-3m rarely to 6m. Leaves turning orange when drying. Flowers yellow-green or greenish cream. Fruit green turning red.

- **Ecology:** Drier forest types, wooded grasslands on rocky hills.
- The species was common on the site of dam construction.
- **Uses:** Medicinal plant not much browsed by ungulates, also used as firewood.

Figure 4-8 :Exocoecaria madagasariensis (Baul) Mull.Arg.

Mugulare (Kip)

- Shrub or tree with white latex in all parts. Bark grey rough or smooth. Leaves grey-green. Flowers yellow to green in terminal spike. Fruit globose.
- **Ecology:** Riverine forest or thicket.
- **Uses:** Latex used as an ingredient for arrow poison. The tree is believed to be poisonous to livestock and can cause dermatitis to individuals with sensitive skin. Good timber is obtained from the tree.

Figure 4-9: Lantana trifolia. L

Sekechewo (Nandi)

- Woody shrub to 3m. Leaves in threes rarely opposite sandy papery above. Flowers purple, or pink. Fruit red or purple.
- **Ecology:** Bushland, bushed grasslands
- **Uses:** The fruits are edible by birds, human and apes. Not very useful for browsing animals. Smoke used to flavor milk. Not common.

Figure 4-10: Solanum giganteum *Jacq*

Iamaata (Ndorobo)

- Shrub or tree 1-4m with small straight and hooked thorns. Leaves densely stellate. Flowers mauve many in terminal panicles. Fruit orange to pale red.
- **Ecology:** Forest margins or under growth.
- **Uses:** Used as live fence, not very useful to browsers.
- Was not common on the site.

Figure 4-11: Persia Americana *Mil*

Avocado (English)

- Tree native to Mexico and Central America, it was brought to Kenya as a horticultural fruit tree.
- **Ecology:** Wooded grasslands (Cultivated)
- **Uses:** Edible fruits, medicinal and firewood

***Figure 4-12: Eucalyptus saligna** Sim.*

Sidney blue gum

- Large Australian hardwood. It can reach a maximum of 65m. It is a common plant timer tree.
- **Ecology:** Mostly found in Ecological zones II and III.
- **Uses:** Timber, charcoal, building and electricity poles. Leaves and charcoal used as medicine.
- Common in the surrounding at the site.

***Figure 4-13: Senna didymobotrya** (Fresen) Irwin and Barney*

Mwenu (Kik)

- Shrub or a small tree 1-7.5m. Leaves compound. Flowers yellow in elongated raceme. Fruits; flattened oblong pods
- **Ecology:** Riverine, by lake shores and forest edges.
- **Uses:** The bark contains tannins. The leaves are used as fish poison, and the leaf infusion as emetic against malaria by the Kipsigis. The species is believed to be poisonous.

- Quite frequent on the site.

Figure 4-14: Ensete ventricosum (Welw) cheesm

Sasuriet (Kipsigis) Wild banana (English)

- Herbaceous tree, pseudostem of old leaf bases to 4m high. Leaves to 5m long. Inflorescence to 3m long with large bracts and pink in colour. Fruit is a small banana 7-12cm long.
- **Ecology:** Moist forest.
- **Uses:** Leaf petioles yield a strong, fine fibres. Leaves used for thatching. The fruit is edible, for apes and birds.
- Not common at the site.

Figure 4-15: Olea Africana (Mill) P.Green

Standard: African brown olive

Yernit (Marakwet)

- Evergreen shrub or tree 3-24m. Bark grey or dark-brown. Leaves glossy dark-green above and leathery. Flowers many in terminal and lateral paniculate cymes, white or creamy yellow.

- **Ecology:** Dry upland evergreen forest (edges, remnants) often associated with juniperus.
- **Uses:** Timber is used for building and furniture also excellent firewood. Root-bark decoction used as remedy for malaria. The fruit is edible, much liked by pigeons.

Figure 4-16: Vernonia amygdalina Del.

Cheburiander (Nandi)

- Shrub or tree 1.8-7.5m. Bark pale grey. Leaves ovate or elliptic. Florets cream or white
- **Ecology:** Lake shores, riverines, along laggas.
- **Uses:** Medicine, the branches are termite resistant.
- It was very common at the construction site.

Figure 4-17: Polygonum afromontanum Greenway

- Creeping, erect or scrambling shrublet 0.2-2m. Leaves elliptic reddish-maroon and glabrous. Flowers greenish white or pink; axillary, several together. Fruits tiny.
- **Ecology:** Hagenia zone, bamboo zone less often forest. Mt. Kenya, Aberdares and Mau.

- **Uses:** Little economic importance to man.
- Common at the site.

Figure 4-18: Hagenia abyssinica (Bruce) J.F. Gmel

Omukunakuna (Kisii) Olboldo (Maasai)

- Tree 5-25 m often with crooked bole. Bark red brown, fissured, peeling. Leaves compound, with winged petiole. Flowers greenish or white, turning reddish in female flowers in drooping panicles.
- **Ecology:** Dominant in the woodland zone just above bamboo, also in moist forest below the bamboo.
- **Uses:** Medicine, timber and firewood.
- The species was very common along the river bank at the site.

Figure 4-19: Croton sylvaticus Hochst

Mutundu (Kamba, Kik, Meru)

- Tree 3-24 m bark smelling of black pepper, grey smooth, leaves broadly ovate densely pubescent at first becoming glabrous. Flowers greenish cream. Fruits orange or red trilobed subglobose or ovoid.

- **Ecology:** Moist evergreen forest, rarely in dry evergreen forest.
- **Uses:** Timber, medicine for malaria, firewood, charcoal, bee forage.

Figure 4-20: Bridelia micrantha (Hochst) Bail

Olleragia (Maasai) Ng'ombe (Luy)

- Shrub or tree 2-18 m bark grey or blackish flaking rough. Trunk and branches often with scattered woody thorns. Leaves elliptic. Flowers pale green in the dense axillary cluster. Fruits purple black ellipsoid with a pointed apex.
- **Ecology:** Usually riverine or in forest margins less often in bushed grasslands.
- **Uses:** The wood is used for building poles and is termite resistant. Bark decoction is employed as medicine against dysentery.
- The species was not common at the site.

Figure 4-21: Ehretia cymosa Thonn

Murembu (Kik) Mutereriet (Kip) Boranet (Nandi)

- Shrub or tree 2-9m. Bark smooth; grey. Leaves ovate or elliptic glabrous or with pubescent veins. Flowers white (Pinkish) in dense terminal panicle. Fruit orange or red, round.
- **Ecology:** Forest (Margin) or secondary vegetation derived from forest.

- **Uses:** The wood is used for tool handles and yokes, used as firewood, as medicine.
- The species was common along the river bank at the site.

Figure 4-22: Dombeya torrida (J.F G. Mel) P. Bamps

Silibwet (Kip) Ol-subukiai (Maasai) Mukeu (Trade)

- Trees 6-24m, leaves broadly ovate densely pubescent, especially on the reddish veins. Flowers white, red at the base inside. In umbels with branched stalks. Fruit round and hairy.
- **Ecology:** Forest often in podocarpus or Hagenia forest.
- **Uses:** Wood used for building but is not durable in the ground. Bark fibres used to make ropes, also used for charcoal and as firewood.

Figure 4-23: Rubus pinnatus Willd

Tagaimamiet (Kips) Engainagut (Maasai)

- Scrambling shrub 1.5-3m. Stems glabrous sometimes with white bloom, and with hooked prickles. Leaves with 5-9 leaflets. Flowers white (pink) in panicles. Fruit red to black.
- **Ecology:** Riverine disturbed forest, secondary bushland.
- **Uses:** Fruits edible by birds, humans, apes. It's not of much economic importance.

Figure 4-24: Arundinaria alpina

African bamboo

- Tree-like perennial grass from 200-1950cm tall. Leaf sheath covered with bristle, leaf blade deciduous. Stems hollow, thick and woody and green. Flowers: Branched clusters in solitary spikes, which can be dense.
- **Ecology:** Mountains and volcanoes surrounding the East African rift between 2,500 and 3,300m.
- **Uses:** Key food for several animals eg. African golden monkeys, gorillas, forest antelopes. Larger stems for building, old stems for firewood and bean stakes, and young stems are used for weaving.
- The species was common at the dam site.

Figure 4-25: Polyscias kikuyensis summerh

Mutati (Trade Kik.) Aoun (Mar) Muachet (Ndorobo)

- Tree 15-24m bole up to 1.4m across with candelabra-like branching; bark grey, smooth. Leaves pinnate, usually with an end leaf. Inflorescence umbel with yellow flowers. Fruits black (sub) globose or ellipsoid.
- **Ecology:** Wet upland forest often in valleys. Endemic to Central Kenya.
- **Uses:** Its soft wood is used for making boxes.
- It was not common at the site.

Figure 4-26: Ekebergia capensis sparm

Ekebergia (std) Araruet (Kips) Oroyuet (Ndorobo)

- Tree 7.5-30m. Bark pale grey, cracking in small rectangular scales. Leaves with 7-11 leaflets. Flowers white or cream in cymes. Fruit yellow red sub-globose.
- **Ecology:** Common in dry forest (podo, olea types), less often in moist, often at forest edge or in forest remnants also in riverine forests.
- **Uses:** The wood is tough, and used for interior carpentry. Also has very good charcoal, fire wood and medicine.

Figure 4-27: Ocotea usambarensis

English (Campor Trade) Muthaiti (Kik.)

- Tree 25-45m, evergreen; massive bole slightly fluted; bark reddish brown. Leaves often sub-opposite and campor scented. Flower greenish in panicles. Fruits ovoid.
- **Ecology:** Moist forests

- **Uses:** Superior hard wood very good for furniture and habitat for birds and monkeys.

Figure 4-28: Rhamnus prinoides L' Herit.

Kosisitiet (Kip) Omungura (Kisii)

- Shrub or tree 1.2m-9m rarely scrambling. Bark grey. Leaves shiny above, ovate or elliptic. Flowers (yellowish) green. Fruits red turning (Purple black) 3 lobed.
- **Ecology:** Forest (edges) less often in secondary bushland or bamboo/heath zone.
- **Uses:** Medicine against gonorrhea, malaria and rheumatism. Also good firewood.
- The species was common at the site.

Figure 4-29: Maytenus heterophylla (ECKl & Zeyh) Robson

Kigorwet (kip, Ndo) Teerkolwa (Marakwet)

- Shrub or small tree 1-6m, spines present. Leaves fasciculate, elliptic or ovate. Flowers white, cream or yellow in dichasia. Fruits red or yellow, obvoid or sometimes 3-lobed.
- **Ecology:** Dry (less often moist) upland and lowland forest riverine in forest or woodland, thickets (clump) bushed grassland.
- **Uses:** Roots are boiled as vegetable by Maasai community. Branches used as firewood, good bee forage.

Figure 4-30: Tamarix nilotica (Ehrenb) Bunge

Echekereng (Turkana)

- Shrub or tree 1-6m, evergreen with brown stems. Leaves sessile, concave. Inflorescence a raceme. Flowers white or pink. Fruit is a capsule.
- **Ecology:** Along rivers in woodland or bushland.
- **Uses:** Used for building, firewood and planted as an ornamental.
- The species was common at the site at the river bank close to water.

Figure 4-31: Syzygium guineense (Willd) DC

Mshiwi (std) Lamechwet (Kip)

- Tree 4-18m, evergreen: bark grey or brown, flaking in patches. Young stems often squrish. Leaves elliptic and glabrous. Flowers filaments white in cymes. Fruits purple black, round or ellipsoid.
- **Ecology:** Wooded grassland or in forests 1500-2550m.
- **Uses:** Timber, edible fruits and medicine.

Figure 4-32: Rubus keniensis standl

Mutare (Kik.)

- Scrambling shrub 1-2.5m, stems reddish, hairy with hooked prickles. Leaves with 3-leaflets ovate or elliptic. Flowers pink or white in loose panicles. Fruits red, ovoid, nearly always galled.
- **Ecology:** Forest margins, riverines or in secondary forests.
- **Uses:** Edible fruits for humans, birds and apes.

Figure 4-33: Euclea racemosa Murr.

Usuet (Nandi, Kip, Tug) Ilikinjai (Samb.)

- Shrub or tree 1-10m. Leaves alternate ovate, glabrous to tomentellous. Flowers white or cream, in racemes. Fruit green round.
- **Ecology:** Forest thickets in wooded grasslands, secondary bushland near forest.
- **Uses:** Bark and roots yield black dye, he fruits are edible, root decoction used as medicine.

Figure 4-34: Hypericum revolutum Vahl.

Giant St. John's wort (std) Susimua (Kik.) Biriwarokiet (Kip)

- Shrub or tree 1-10m, bark red brown scaly. Leaves narrowly elliptic, glabrous. Flowers yellow-orange, solitary and terminal. Fruit ellipsoid.
- **Ecology:** Forest margins, Hagenia-Hypericum zone, heath zone.
- **Uses:** Firewood, medicine and bee forage among others.
- This species was common at KFS camp where the pipeline will go through.

Figure 4-35: Vernonia syringifolia O. Hoffm.

Mucatha (Kik.)

- A scrambling shrub with cordate or truncate, ovate leaves which are variously hairy below: heads with purplish phyllaries, in terminal round topped corymbs. Florets pale purple.
- **Ecology:** Edges of Montane rain forest.
- **Uses:** Medicinal plant.

Figure 4-36: Acacia mearnsii De Willd

Black wattle

- Small tree 10-15m native to Australia. The leaves compound and dark green. Flowers creamy white in globose heads. Fruit: sickle-shaped pods.
- **Ecology:** In Kenya, the species is restricted in highlands in wooded bushlands.
- **Uses:** Charcoal, bark for tanning leather, building poles, bee forage and very good soil binder.

Figure 4-37: Vernonia auratiaca (O. Hoffm) N.E. Br.

Mukmu (Borana)

- Scrambler 1.2-4m divaricately branching. Leaves ovate or elliptic, scabridulous on both sides. Flrorets yellow, in dense inflorescences.
- **Ecology:** Common in bushlands.
- **Uses:** Plant of low economic importance.

Figure 4-38: Lannea schweinfurthii (Engl) Engl

Goinyet (Kip) Muasi (Kamb) Oropondo (Maasai)

- Shrub or tree 3-15m with spreading crown. Bark; grey fissured. Leaves with (1) 3-7 (9) leaflets, elliptic or ovate, glabrous. Flowers cream or greenish yellow, in spikes or panicles. Fruit pinkish, ellipsoid.
- **Ecology:** Wooded grassland, bushed grassland, semi-evergreen bushland, dry forest or woodland.
- **Uses:** The fruit is edible, the bark is used for making tea, rope and red-brown dye; a decoction of the bark is employed against headache and stomachache. Wood used to make stools and grain pestles, charcoal for smelting iron.

Figure 4-39: Dombeya burgessiae Gerrard

Silibwet (Kip) Muvau (Kamb) Olsubukioi (Maasai)

Shrub or tree 1-6m, leaves broadly ovate base deeply cordate densely pubescent on both sides. Flowers white or pink in long stalked umbels. Fruit round, very hairy.

- **Ecology:** Open forest, riverine vegetation (forest/woodland thickets), semi-evergreen bushland.

- **Uses:** The bark fibre is used to make rope, the wood is used for bows and building poles. Twigs used as fire sticks. Parts used in cough medicine.

Figure 4-40: Eragrostis kiwuensis

Dark love grass

Annual or tufted perennial to 120cm tall. Common and numerous in grassland of high altitude and as weed of arable land. In grasslands it forma small tufts between the taller grasses and is usually well grazed.

- **Ecology:** High altitude grasslands, open woodlands and forest edges.
- Highly palatable grass for grazers.

Figure 4-41: Euclea divinorum Hiern.

Jutuiya (Mar) Lchingei (Samb) Uswa, uswet (Kip, Tug, Seb).

- Shrub or tree 1-9m evergreen, bark dark grey, fissured. Leaves sub-opposite narrowly elliptic, dark green. Flowers whitish in short racemes. Fruit green round.
- **Ecology:** Dry forest (margins), riverine in bushlands or forest, in bushed grassland, evergreen bushland.

- **Uses:** Often a weed of pastures, due to its phenomenal power of coppicing and root suckering. Fruits are edible, root decoction used as purgative and infusion as an appetizer.

Figure 4-42: Pinus patula Schiede ex Schitdl & Cham

Mexican weeping pine (std)

- Tree to 40m tall, usually with a single, straight, slender trunk, in closed canopy stands. Bark on young trees thin, scaly, red-brown, with age becoming thick. Shoots rough and scaly when the leaf fasciles have fallen.
- **Ecology:** Highland tree as from 1800-2700m above sea level. It does not withstand long periods of low temperatures.
- **Uses:** Very useful timber tree and for paper industry.

Figure 4-43: Myrsine Africana L.

Olsegetiti (Maa.) Osegeteti (Kip)

- Under shrub to small tree 1-5m. Branches grey-brown to purple, straited. New shoots densely hairy. Leaves sub-sessile, crowded, stiff and glabrous, very variable in shape. Flowers cluster amongst leaves on new growth, greenish white to pink with creamsom anthers. Fruit globose.
- **Ecology:** Wide spread particularly in upland dry forest and rocky hill sides.
- **Uses:** Bark, roots and fruits used as anthelmintic.

Figure 4-44: Croton macrostachyus Del

Tebeswet (Kip, Nandi, Tug) Mutundu (Kik, Meru, Kamb)

- Tree 3-25m, bark grey or grey-brown, finely reticulate. Leaves turning orang before falling. Flowers yellowish in clusters, either all male or female or mixed. Fruit grey, tri-lobed stellate-pubescent.
- **Ecology:** Moist or dry evergreen upland forest (remnants, edges) also river or woodland grassland or clumb bushland.
- **Uses:** The wood is used for making stools or axe handles, roots are used as remedy for stomach worms. Burnt leaves and root decoction used as remedy for malaria.

Figure 4-45: Vangueria madagascariensis G. mel

Komolik (Tug) Kamolwet (Seb)

- Shrub or tree 3-10m. Bark brown, scaly. Leaves elliptic or ovate; glabrous or nearly so. Flowers cream or yellowish green in fairly dense cymes. Fruit yellow to brown, depressed globose.
- **Ecology:** Riverine forest, bushland, rocky bushland, ground-water forest.

- **Uses:** The fruit is edible, and is used for flavouring beer. It is also used as a medicinal plant against internal parasites and diarrhea.

Figure 4-46: Allophyllus abysinicus (Hochst) Radlk

Mushami (std, Kik.) Sasuriet, mororta (Kip)

- Shrub 1.2m or a tree up to 21m. Bark grey and smooth. Lateral leaflet two thirds to one times as large as the terminal one. Flowers white, in panicles 10-16cm. Fruit ovoid.
- **Ecology:** Dry moist forest (remnants) riverine forest.
- **Uses:** Wood used for building though not durable, used for charcoal and firewood, habitat for birds.

Figure 4-47: Loranthus spp.

- Semi-parasitic plant common on *Croton macrostachyus*

Figure 4-48: Prunus Africana (Hook.f) Kalkm .I

Tenduet (Elg, Kip, Ndo) Ol-koijuka (Maa) Tendwet (Mar)

- Evergreen tree 6-25m (rarely) a shrub in lava forest. Bark grey-black corrugated. Leave often with red petiole and midrib, ovate, elliptic, glabrous. Flowers white or cream in axillary racemes. Fruit red to purple black.
- **Ecology:** Moist evergreen forest, riverine vegetation.
- **Uses:** Excellent timber, used for house building and furniture. Bark infusion as purgative. Bark used for prostrate medicine.

Figure 4-49: Ficus natalensis Hochst

Mugumo (Kik, std)

- Tree 5-30m often epiphytic, evergreen. Leaves elliptic or obovate and glabrous. Figs in leaf axils or just below the leaves; basal bracts caducous: figs yellow to red, globose and often stipitate; glabrous usually wrinkled when dry.
- **Ecology:** Riverine and ground water forest; presumably also in forest away from water.
- **Uses:** Cultural, figs eaten by birds and apes, firewood, soil binder.

Figure 4-50: Albizia gummifera (JF Gmel) C.A Sm.

Omulera (std) Mcani Mbao (Swa) Seet, Seyet (Kip, Nan)

- Tree 4.5-30m; flat crown, bark smooth, grey 9rarely rough). Leaves pinnately compound, leaflets of top pinnae obliquely rhombic, pubescent or glabrous. Flowers white; seminal tube exerted. Fruit glossy 9reddish or purplish) glabrous or nearly so.
- **Ecology:** Dry or wet lowland, or upland forest edges, also riverine forest; may be locally common.
- **Uses:** Used for timber, but not very durable. Bark decoction used traditionally as alternative medicine for malaria. Leaves for ripening bananas, charcoal, firewood and also bee forage. Pods and leaves browsed well by livestock and wild ungulates.

Figure 4-51: Juniperus procera Endl

Tarakwet (Kip, Mar, Nan) Pencil cedar (std)

- Tree to 40m; crown pyramidal in youth, later spreading. Bark pale brown; cracking and peeling in long narrow strips. Juvenile leaves in 3s, linear, spine-tipped. Cones: dioecious. Male cones yellowish, ellipsoid with about 10 scales. Female cones red-brown; sub-globose, with about 6-8 scales. Ripe fruit waxy blue-grey, berry-like, globose with 1-4 seeds.

- **Ecology:** Drier upland forests, associated with podocarpus, olea or croton between 1800-2950m. Also scattered individuals on rocky hills or mountains, on shallow rocky soils.
- **Uses:** An important timber, bark used for beehives cleaning and also medicinal.
- The species was common along the proposed pipeline at Chepsir.

Figure 4-52: Dodonaea angustifolia L.f.

Orgeturia, Ol-Tuyesi (Maa) Talibilikwa (Mar) Mkaa-Pwani (Swa)

- Shrub or tree 1-6m. Leaves glossy, sticky with resin (narrowly) elliptic and glabrous. Flowers yellow-green, in panicles 2-5cm long. The fruit is pinkish or reddish 2-3 winged.
- **Ecology:** Evergreen (secondary) bushland, usually in rocky, stony, or lava sites, also in forest margins. This species can withstand fires to an amazing degree.
- **Uses:** Wood hard, heavily used for tool handles and walking sticks. A good hedge species, used for sand binding. It is also a medicinal plant to various communities in Kenya.
- The species was common at Chachegwani.

Figure 4-53: Ficus sur Forssk.

Olngaboli (Maa) Lingaboli (Samburu) Mogoyuet (Kip)

- Tree 4-25m, sometimes epiphytic; butteress may be present. Bark grey or whitish. Leaves ovate or elliptic, margin repand-dentate or occasionally entire, glabrous, pubescent or sand papery. Figs on leafless branches, on old wood. Figs orange/red globose 5-33mm across, puberous or densely tomentose.
- **Ecology:** Riverine forest and bush, ground-water forest less often in forest away from water.
- **Uses:** Fruit edible by man, apes and birds. Root decoction used as medicine for cough. Bark infusion against stomachache and babies diarrhea. The wood is used for stools and grain mortars.
- The species was common along pipeline route as from Chepsir to Sachag'wan.

Figure 4-54: Toddalia asiatica (L) Lam

Ole-Pormunyo (Maa) Kipkeres, Kipkutai (Mar) Chepidorwet (Kip) Usuet (Nandi) Womboriot (Ndo) Kikombe-cha-chui (Dig)

- Climbing shrub or liana 2-15m: in lianas the lower stem is beset with spines on corky pyramids; branches and often undersides of leaves with hooked prickles to 5mm. Leaflets elliptic or slightly obovate and glabrous. Flowers greenish-yellow in axillary and terminal panicles. Fruit orange, round 7-10mm.
- **Ecology:** (Riverine) forest margins or secondary regrowth in grassland and thickets.
- **Uses:** The fruit is chewed as cough remedy. Root decoction is employed as an emetic and purgative by the Maasai community.
- This species was dominant around Chachegwan, along the road.

Figure 4-55: Zanthoxylum gilleti (De Willd) Waterm ***(Faraga macrophylla)***

African Satin Wood (std) Sagawoita (Kip, Nan) Kikomit (Ndo)

- Tree 10-27m: deciduous, trunk smooth green with spines on basses. Branches with straight or slightly recurved spines. Leaves with 13-27 leaflets; margin entire or cranate, glabrous. Flowers cream or yellow, in terminal or axillary panicles. Fruit reddish almost round.
- **Ecology:** Moist forest.
- This was common around Chachegwan.

Figure 4-56: Pittosporum viridiflorum Sims

Olegararia (Maa) Kipkeriet, chemongariot (Kip) Chemnoa (Mar)

- Tree (less often a shrub) 3-15m evergreen. Leaves obovate, glabrous. Flowers white or cream in short terminal dense panicles. Fruit yellow or orange, round with the style on top; splitting into two. Seeds red, sticky.
- **Ecology:** Dry evergreen forest or riverine thickets/forests. Wooded grassland.
- **Uses:** The bark produces an emetic medicine used by Pokot. Wood used for building poles, timber, root fibres used in basketry by Taita community.
- The species was found around Chachengwan.

Figure 4-57: Warbugia ugandensis Sprague

East African green heart (std) sogoet, soke (Kip & Tug) Marut (Ndo) Ol-sogonoi (Maa)

- Tree 4.5-30m, evergreen: crown rounded, bark smooth or scaly, pale grey or brown. Leaves very glossy dark green above. Flower yellow-green. Fruit when young ellipsoid, when ripe purplish and sub-globose.

- **Ecology:** Riverine forest and drier upland forests also in Acacia xanthphloea woodland and on termite hills in wooded grassland.
- **Uses:** Good timber for building and furniture, but not termite resistant, bark and roots used in remedy for chest pains, common cold, malaria and toothaches. Fruit edible; all parts have hot peppery taste. The resin is used as glue.

Figure 4-58: Ficus thonnigii Bl

Mugumo (Emb, Kik, Mer, Kamb, std) Sapoitit (Okiek)

- Tree 6-21m sometimes epiphytic, evergreen. Bark grey, aerial roots often present. Leaves elliptic or obovate glabrous, or pubescent. Figs in leaf axils sometimes below the leaves, sessile on peduncles persistent. Figs yellow or red, globose or ellipsoid smooth or warted, glabrous or pubescent.
- **Ecology:** Wet or dry upland forest often left standing after clearing. Riverine on rocky sites, bushland or wooded grassland.
- **Uses:** Cultural, ceremonial tree in more than one culture. Fruit edible. Bark fibre used for string. Branches used as fire sticks.

Figure 4-59: Rhus natalensis Krauss

Suriet, sirondet (Kip) Mutheu (Kamb) Muthigio (Kik0

- Shrub or tree 1.5-6m. Bark of branchlets pale grey or whitish. Leaflets elliptic or obovate, glabrous or sparsely pubescent. Flowers greenish-cream on long panicles. Fruit orange, ellipsoid.
- **Ecology:** Dry forest margins (semi) evergreen bushland, thickets and wooded grassland.
- **Uses:** Firewood, medicine and fruit is edible.

Figure 4-60: Acacia xanthophloea Benth

Fever tree (std) Reno (Mar) Olerai (Maa) Ochymnyaliet (Kip)

- Tree 4.5-25m with flat crwon and greyish yellow or pale yellow bark, smooth and powdery: spines in heads, white or purplish. Fruit yellow brown or brown straight or slightly curved constricted between seeds, glabrous or nearly so, indehiscent and breaking into segments.
- **Ecology:** In places with high ground water, lake sides, river valleys, black cotton soil areas.
- **Uses:** Gum is edible, and bark decoction is used as medicine against ingestion. Firewood, bee forage, and as browse plant.

Figure 4-61: Calodendrum capense (L.f) Thunb

Kipkaria, Sasuriet (Kip) Ol-larashi (Maasai) Larachi (Samb)

- Tree 5-15m; bark grey, smooth. Leaves (broadly) ellipsoid with stellate hairs when young but glabrescent. Flowers pink, with pink or white dark dotted staminodes, in panicles to 15cm. fruit round, covered in warty prickles; with black seeds.
- **Ecology:** Dry upland forests (remnants) also in riverine forest.
- **Uses:** The timber is tough and bends well and is used in house building, the wood is used for implements like stools and knife handles. A very beautiful tree also planted in gardens and parks.

Figure 4-62: Teclea nobilis Del.

Galai (Maa) Koorea (Mar) Munderendu (Kik, std)

- Tree 4-18m, evergreen: less often a shrub. Bark grey-brown; finely grooved. Leaves (1) 3-foliate. Leaflets elliptic glabrous or nearly so. Flowers yellow green in terminal or axillary panicles. Fruits yellow, orange or red round ellipsoid.

- **Ecology:** Evergreen forest, thickets on rocky hills, riverine, wooded grasslands, may be common in dry forests.
- **Uses:** The fruit is edible, the wood is used to make bows and walking sticks, and a leaf decoction is used against pneumonia by the Maasai.

Figure 4-63: Cussonia holstii Engl

Sokwet, lulukwet (Kip) Ol-orur (Maa) Soya (Tug)

- Tree 4-15m, bark rough and grey. Leaves palmately lobed or digitate compound. Infloresence in spikes of 5-15 (30) together with greenish yellow flowers. Fruit whitish or yellow, ovate 4-6mm long glabrous or puberulous.
- **Ecology:** Evergreen bushland on rocky slopes, grouped tree grassland, dry forest edges.
- **Uses:** Hallow trunks are used to make beehives. Wood soft, white used for doors by Kipsigis. Bark decoction used by Maasai and Meru for driving out placenta.
- Thus species was very common at Ngata farm along the road.

Figure 4-64: Grevillea robusta A. cunn ex R.Br.

Silky oak (std) Mukima (Kik) Kuvuria (Kamb)

- It is a fast growing tree (evergreen) between 18-35m tall with dark green delicately dented bi-pinnatified leaves. Flowers golden orange, bottle brush-like blooms. Bark grey smooth when young becoming furrowed as it matures. Fruits: capsules producing winged papery seeds.
- **Ecology:** An exotic species from Australia, brought to Kenya for purposes of wind break. It can grow in ecological zones 3 and 4.
- **Uses:** Wind breaks in coffee and tea plantations, firewood, timber though not durable, produces high quality honey.

Figure 4-65: Fraxinus pennsylvanica Marshal

Green ash or red ash tree (std)

- A medium sized deciduous tree 12-25m; bark smooth and grey when young becoming thick and fissured with age. Leaves 15-30 cm, pinnately compound. Flowers in compact panicles, inconspicuous without petals. Fruits, samara 2.5-7.5cm long comprising of a single seed.
- **Ecology:** This is a native of North East and Central America. In Kenya, it grows best in ecological zones III and IV.
- **Uses:** Ornamental tree for gardens and parks, timber and firewood.

Figure 4-66: Jacaranda mimosifolia D. Don

Jacaranda (std)

- Tree 5-15m. Bark thin smooth and grey-brown though it becomes finely scaly. Twigs are slender and slightly zigzag. The flowers are in panicles, purple in colour. Fruit is a woody capsule, producing fat numerous winged seeds.
- **Ecology:** The species is a native of Central America, but has become naturized in Kenya. It is widely distributed in most of our ecological zones apart from zones I and VI.
- **Uses:** Ornamental tree for gardens and parks, firewood, bee hives, bee forage, as wind breaks also.

Figure 4-67: Acacia albida Del.

Apple ring acacia (std) Ol-erai (Maa) Sangak (Pokot)

- Tree 3-15m: crown spreading, bark rough, brown or grey. Branches whitish. Spines I pairs of straight, 4-20cm long, sometimes abscent. Leaves 2-20 pairs. Flowers in spikes, cream. Fruit bright orange, falcate or curled into a coil, glabrous or rarely puberulous, indehiscent.
- **Ecology:** Riverine in dry areas, lake sides or ground water forest.
- **Uses:** Pods are eaten by livestock and wild ungulates, the bark contain tannins. It is also used for timber.

Figure 4-68: Albizia amara (Roxb) Boiv.

Papan (Pokot) Kotutwo (Tug)

- Tree 2-13m, deciduous with rough furrowed bark. Leaves compound, leaflets in 10-48 pairs; symmetrical pubescent to glabrescent. Flowers white or yellow, staminal tube not hardly exserted. Fruit brown and puberulous.
- **Ecology:** Acacia-commiphora bushland less often in wooded grasslands.

- **Uses:** Firewood, bark used to induce vomiting, leaves applied on foot wounds, wood hard and strong, makes good charcoal.

Figure 4-69: Acacia polyacantha Willd

Falcon claw acacia (std) Mkengewa (swa)

- Tree 3.5-18m: bark yellow-brown, scaly, papery. Prickles in pairs, just below the nodes (sometimes absent from branches) recurved. Leaves with 5-12cm long white or cream. Fruit: brown, straight glabrous, dehiscent.
- **Ecology:** Riverine forest or woodland, grassland often in areas with impeded drainage.
- **Uses:** Wood resinous, more durable than that of other acacias. Gum edible but inferior to that of *A. Senegal, A.seyal* and *A. sieberiana.*

Figure 4-70: Acacia hockii De Willd

White thorn (std) Tilatiliet (Nan) Ol-jarbolan (Maa) Lerai (Sam)

- Shrub or tree 1.5-6 (9) m often with flat crown. Bark yellow, peeling or (where burned) grey brown and in plates. Spines in pairs at the nodes, straight. Leaves compound, leaflets in 9-29 pairs. Flowers in heads, yellow or orange. Fruit reddish, falcate, glabrous or puberulous, dehiscent.

- **Ecology:** Wooded grasslands, Acacia woodland, bushed grassland, deciduous or semi-evergreen bushland: and invader of overgrazed grasslands.
- **Uses:** The bark is used for making rope, inner bark used as medicine against thirst, and branches used to construct bomas, also very good firewood.

Figure 4-71: Acacia lahai Benth

Red thorn (std) Mugaa (Kik) Chepitet/Kerichsan (Kip) Oldebes (Maa) Telak (Mar)

- Tree 3-15m with flat crown. Bark brown, rough with longitudinal scales. Spines in pairs at nodes, straight pale. Leaves with (3) 6-15 pairs of pinnae. Flowers in spikes white, cream or pale yellow. Fruit brown, straight, or falcate, glabrous, indehiscent.
- **Ecology:** Locally common where upland forest has disappeared forming dense woodland or invading grassland.
- **Uses:** Timber for construction work, bark used by Marakwet community as a stringent, fire wood, charcoal, habitat for birds.

4.5.2 Fauna

The following is a description of the fauna encountered in the proposed project sites.

Figure 4-72: The African Hoopoe

The African Hoopoe is a bird of wooded savannah, cultivated land, pastures and short grassy areas in park and gardens. Difficult to confuse with any other species. The head, neck, mantle, breast and belly are bright rufous, the undertail coverts are buff-

white. The feathers of the forehead and crown form a crest which, when erect, is fan-shaped, these feathers are tipped with black. The wings are black with broad white bands, the primary and secondary feathers are black with a white band towards the tips. The tail is black with a broad white band across the centre. The eyes are dark brown, the long decurved bill is blackish and the legs and feet are grey-black. The sexes are similar, the female being duller and slightly smaller. Resident. Size 28 ems.

Figure 4-73: African Spoonbill

The African Spoonbill occurs over much of East Africa favouring both fresh and alkaline lakes, rivers, marshes and swamps. A bird with pure white plumage. The forehead, front of face and chin are bright red and unfeathered. The most obvious identification feature is the large spoon-like pink and grey bill which is used in a sweeping motion when feeding. The legs and feet are pink-red. The sexes are alike. Immatures have plumage streaked with brown and lack strong colour in the face, bill and legs, the feet are black. Resident. Size 90 ems.

Figure 4-74: Avocet

The Avocet is a bird of both freshwater and alkaline lakes, mudflats, flood plains and estuaries. The head and hindneck are black. The chin, cheeks, throat, foreneck, breast

and underparts are white. The back, rump, tail and secondary wing feathers are white, the wing coverts and primaries black. The thin upturned bill which is specially adapted for feeding is black. The legs and feet are pale blue. The sexes are similar, the female occasionally having areas of black plumage tinged brown. A resident and palearctic winter visitor. Size 43 ems.

Figure 4-75: Blacksmith Plover

The Blacksmith Plover is an inhabitant of lake edges, swamps, marshes and riverbanks. The forehead and crown are white. The hind-crown, nape, face, chin, neck and breast are black. The hindneck, belly and underparts are white. The back and outer scapulars are black, the inner scapulars and wing coverts are silver-grey. The primary and secondary wing feathers are black, the rump and tail are white the latter having a terminal band of black. The eyes are a rich dark red, the bill, legs and feet are black. The sexes are alike. Resident. Size 28 ems.

Figure 4-76: Blue Sterling

The greater blue-eared starling is a 22-cm long, short tailed bird. This species is glossy blue-green with a purple-blue belly and blue ear patch. Its iris is bright yellow or orange. The sexes are similar, but the juvenile is duller and has blackish brown underparts. The populations from southern Kenya southwards are smaller than northern birds and

are sometimes considered to be a separate subspecies, *L. c. sycobius.* The lesser blue-eared starling is similar to this species, but the blue of the belly does not extend forward of the legs. The greater blue-eared starling has a range of musical or grating calls, but the most familiar is a nasal *squee-ar.* The greater blue-eared starling nests in holes in trees, either natural or excavated by woodpeckers or barbets. It will also nest inside the large stick nests of the sacred ibis or Abdim's stork. A nest will include three to five eggs, which are usually greenish-blue with brown or purple spots, and hatch in 13–14 days. The chicks leave the nest roughly 23 days after hatching.This species is parasitised by the great spotted cuckoo and occasionally by the greater honeyguide. The greater blue-eared starling is highly gregarious and will form large flocks, often with other starlings. Its roosts, in reedbed, thorn bushes, or acacia, may also be shared. Like other starlings, the greater blue-eared starling is an omnivore, taking a wide range of invertebrates seeds and berries, especially figs, but is diet is mainly insects taken from the ground. It will perch on livestock, feeding on insects disturbed by the animals and occasionally removing ecto-parasites.

Figure 4-77: Cattle Egret

The Cattle Egret is a very common and widely distributed bird of open plains, lakes, rivers and marshes. Often in association with plains game animals, feeding on insects disturbed from the grasses by the grazing herds. The plumage is almost entirely white during periods of non-breeding. At breeding times golden-buff elongated plumes appear on the crown the breast and the mantle. The bill is yellow-orange, the legs and feet yellow or pale orange-pink. The sexes are alike. Immatures resemble non-breeding adults but with the bill, legs and feet black. Resident. Size 50 ems.

Figure 4-78: White Necked Cormorant

The White Necked Cormorant is a common waterbird of freshwater and alkaline lakes as well as rivers and, to a lesser extent, coastal regions. A large blackish-brown bird with white throat and fore-neck and, in breeding plumage, a white patch to the sides of the rump and a crest of black feathers on the crown. Immature birds are duller and browner than adults with the throat, neck, breast and belly white, streaked and flecked with greyish-brown. The bill is dark with an red-orange mark on the lores. The eyes are emerald green. They are normally found in large flocks, feeding by pursuing fish underwater and are often seen following a feeding session, perched with wings spread to dry. Resident. Size 90 ems.

Figure 4-79: Crowned Crane

The Crowned Crane is a large long legged bird of open grasslands, lakes, swamps and farmland. The forehead and fore-crown are black, the hind-crown and nape have a stiff crest of golden yellow feathers. The neck is light grey with loose feathers at the base trailing onto the breast and mantle. The upperparts are black. The wing coverts are buff white to golden yellow, the secondary wing feathers are black and chestnut, the primaries are glossy black. The breast is grey-black with long, loose feathering on the upper portion, the belly and underparts are dark grey-black. The cheeks are white with a red flash extending along the sides of the hind-crown. The throat has a bright

red wattle. The eyes are pale blue and the bill, legs and feet are black. The sexes are similar, the crest is less developed in the female. Resident. Size 102 ems.

Figure 4-80: Egyptian Goose

The Egyptian Goose is a common and widely distributed goose, favouring inland waters, swamps and rivers. Predominantly grey-buff on the head, fore-neck, breast, belly, back, underparts and flanks. A dark brown patch encircles the orange eyes. The nape and wing coverts are chestnut and an irregular blotch of chestnut feathers can be seen on the lower breast. The rump, tail and primary wing feathers are black. The secondary wing feathers have an iridescent sheen of metallic green. The bill is dark pink and the legs and feet a rich red. The sexes are similar, the females being slightly smaller. Resident. Size 60 ems

Figure 4-81: White Pelicans

White Pelicans are recognizable when at rest or on water by their almost completely white plumage which often has a flush of pink during the breeding season. In flight the black primary and secondary wing feathers are prominent. The large bill is greyish-yellow and the pouch yellow to pinkish-white. Immature birds are greyish-brown, becoming whiter with age. The legs and feet are orange-pink. The eyes are dark brown and surrounded by a patch of unfeathered pink skin. A very gregarious bird normally fishing in groups on freshwater and alkaline lakes. Resident. Size 165 ems.

Figure 4-82: Grey Heron

The Grey Heron is a common and widespread species on lakes, swamps and marshes. A large heron with body and wing plumage grey-blue. The forehead, crown , chin, face and neck are white. A black stripe extends from above and behind the eyes to the back of the crown from which flow several long black plumes. A line of black streaks extends down the centre of the foreneck terminating at the white breast. The belly, wing tips and shoulders are black, the bill, legs and feet greyish-yellow. The eyes are bright yellow. The sexes are alike. Immature birds are generally paler and duller than adults, with underparts streaked with brown. Resident and palearctic winter visitor. Size 100 ems.

Figure 4-83: Helmeted Guinea Fowl

The Helmeted Guinea Fowl is common throughout the region in open grasslands with scattered bush, along woodland edges and on cultivated farmland. The head and neck are unfeathered and boldly marked with bright red on the forehead, around the base of the bill and on the lower cheeks. The sides of the face and neck are bright powder blue. On the crown is a reddish-orange casque of variable size. The hindneck has a line of short, spiky black feathers and the throat and foreneck are black. The plumage of both upper and underparts is dark brown-black with white spots, the spots being smaller and more concentrated on the lower neck, breast and back becoming larger

towards the rear. The primary and secondary wing feathers are dark brown-black with white bars rather than spots. The eyes are dark brown. The bill is dull yellow-orange, the legs and feet brownish black. The sexes are similar, the female being slightly smaller than the male. They roost above the ground in trees and spend the daytime foraging in large flocks feeding on seeds, roots and a variety of insects including grasshoppers

Figure 4-84: Sacred Ibis

The Sacred Ibis is widely distributed throughout East Africa, usually in wet habitats but often in areas of cultivated land. The body plumage is white, the wings have black tips to the primary feathers. Long black plumes flow from the lower back over the tail. The head and neck are black and unfeathered. The black bill is long and decurved. The legs and feet are black. Patches of bare skin on the underwing show bright red in flight. The eyes are darkbrown. The sexes are alike. Resident. Size 75 ems

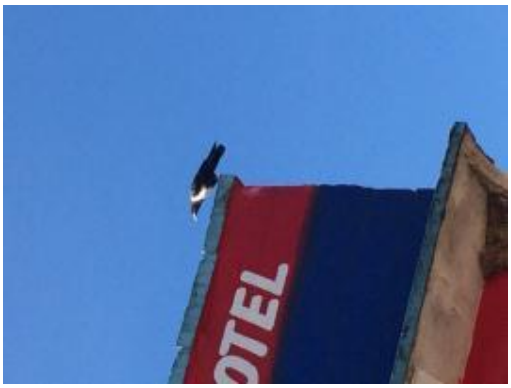


Figure 4-85: Pied Crow

The Pied Crow is a locally distributed but common species in East Africa, being found in a wide variety ofhabitat types including open grasslands, lake and river edges, cultivated farmland and towns and cities. The head, throat and upper breast are glossy black, the mantle; the sides of the neck and the lower breast are white. The belly, underparts , wings and tail are glossy black. The eyes are dark brown, the legs and feet are black. The sexes are alike. Resident. Size 46 ems.

Figure 4-86: Lesser Flamingos

The Lesser Flamingos is found in enormous on the alkaline lakes of the rift valley. The plumage varies from almost pure white, in young and non-breeding birds, to pale rose pink during breeding periods. The primary wing feathers are black and the wing coverts deep crimson. The bill is broad and curved, black at the base and the tip with a varying amount of deep red in the centre portion. The eyes are bright yellow-orange and the long, thin legs and feet are bright red. The female is smaller and paler in colour than the male. Immature birds have a grey-brown plumage. Resident. Size 100 ems.

Figure 4-87: Lilac Breasted Roller

The Lilac Breasted Roller is the commonest of East Africa's rollers found in woodland, open thornbush country and lightly wooded savannah. The forehead and eyebrow are white, the crown and nape are pale green. A narrow black stripe runs through the eye, the cheeks are rufous with a wash of lilac. The chin is white, the throat and breast are lilac streaked with white. The belly and underparts are turquoise blue. The mantle, back and scapulars are brown, the rump is dark blue with turquoise blue uppertail coverts.The tail is azure blue with long central streamers darkish blue and brown. The wing coverts are dark and azure blue, the primaries are bright azure blue and black.

The eyes are dark brown, the bill is blackish and the legs and feet yellowish-pink. The sexes are alike. Resident. Size 40 ems.

Figure 4-88: Little Egret

The Little Egret is a widely distributed species on lakes, swamps, marshes, ponds and in coastal regions. A small egret with entirely white plumage, easily identified by the black legs and bright yellow feet. The bill is grey-black and the eyes are yellow. During the breeding season they develop long thin plume feathers which flow from the rear of the crown and from the mantle and lowerforeneck. The sexes are alike. The immatures resemble non-breeding adults. Resident and palearctic winter visitor. Size 58 ems.

Figure 4-89: Marabou Stork

The Marabou Stork is an extremely large and widely distributed stork with a rather grotesque appearance. The upperparts, wings and tail are blue-black. The breast, belly and underparts are white. The head is unfeathered, pink to red in colour and mottled with black at the base of the bill, the forehead and around the eyes. The neck is white and sparsely feathered but has a ruff of whitish feathers at the base. The bill is pale yellow-cream. The legs and feet are grey-black, but quite often 'whitened' with

droppings. A large pendulous pink throat pouch is often present. The sexes are alike. Resident. Size 150 ems.

Figure 4-90: Northern Masked Weaver

The Northern Masked Weaver is a weaver of lake edges and swamps with limited local distribution. The breeding male has the forehead black, becoming chestnut on the fore-crown. The hind-crown, nape, sides of the neck, breast, belly and underparts are bright yellow. A black face-mask covers the lores, eyes, cheeks, chin and upper throat. The mantle and wing coverts are yellow with a wash of olive, the primary and secondary wing feathers are dark brown, broadly edged with yellow. The rump is bright yellow and the tail is olive-brown edged with yellow. In non-breeding plumage the males are similar to the females, having the head olive/yellow finely streaked and flecked with black, the breast, belly and underparts are buff/white. The mantle and wing coverts are brown/black edged with buff. The eyes are deep red, the bill is black and the legs and feet are flesh pink. Resident. Size 15 ems.

Figure 4-91: Purple Heron

The Purple Heron is an inhabitant of lakes, swamps and marshes throughout East Africa. A slim heron readily distinguished from the Grey Heron (Ardea cinerea) by the

bright rufous feathering of the neck and head. The plumage of the upper body and wings is slate- grey washed with rufous. The forehead and crown are black, two black stripes extend from the gape, one following a line to the nape and down the hindneck, whilst the other extends down the sides of the neck to the breast. The throat and foreneck are white heavily streaked with black. The breast, belly and shoulders are chestnut. The bill is deep yellow, the legs and feet yellow-black and the eyes yellow. The sexes are alike. Immatures are paler and mottled in appearance. Resident and palearctic winter visitor. Size 85 ems

Figure 4-92: Grey Headed Gull

The Grey Headed Gullis a common gull on inland freshwater and alkaline lakes and along rivers. The forehead, crown, face, chin and upper throat are soft grey, the neck, lower throat, breast, belly and underparts are white with a faint wash of pink. The wing coverts and secondary wing feathers are grey, the primaries are black the outermost feathers having distinctive white mirrors. The rump and tail are white. The eyes are pale yellow set in a bright red orbital ring. The bill is deep blood red and the legs and feet are bright red. In non-breeding plumage the grey head becomes paler and the pink flush is lost from the white feathering. The sexes are similar, the female being slightly smaller than the male. Usually encountered in flocks feeding from the surface of the water taking fish and insects, but will readily scavenge on rubbish tips.They will also take eggs and young from the nests of other waterbirds. Resident. Size 40 cms.

Figure 4-93: Somali Ostrich

The Somali Ostrich occurs and is found in parts of Ethiopia, Somalia and Kenya. The male differs in appearance in having blue-grey neck and thighs and a red stripe on the front of the lower leg. They prefer areas of short grass plains and dry semi-desert bush and scrub. During the breeding season several females may lay in the same nest and 70+ eggs have been recorded. It is only possible for the incubating bird, usually the 'major hen', to cover around 20 eggs so in circumstances of larger clutches many go to waste. The incubation period is 45 days and after hatching chicks from many different broods may join together into a creche. The raising and protection of the chicks, which continues for around 9 months, is often undertaken by a 'major pair', with other adults in loose association. Resident. Size 2 to 2.5 metres.

Figure 4-94: Jacksons Widowbird

The Jacksons Widowbird is a species of highland regions at elevations over 1500 metres The male in breeding plumage has a long decurved tail and almost entirely black feathering, the only exceptions being a yellow/brown shoulder patch and the flight feathers having brown edges. Males are often seen displaying, leaping several feet into the air from deep grass. The female has the upper feathering dark brown

boldly edged and streaked with buff. The underside is buffwith darker streaking on the breast and flanks. In non-breeding plumage the male is similar to the female but is generally browner. The eyes are dark brown, the bill of the breeding male is blue/grey, the bill of the female is yellow/grey. The legs and feet are black. Resident. Size: Breeding male 36 ems, female 14 ems.

Figure 4-95: Yellow Billed Stork

The Yellow Billed Stork is widespread and very common in suitable habitats, lakes, marshes and swamps being favored. The head, neck, upper and underparts, back, breast and belly are white, often with a flush of pink. The tail and primary wing feathers are black. The face and forehead are bright red and the long bill is bright yellow. The legs and feet are bright red. The eyes are dark brown. The sexes are alike. Immature birds are duller with the body feathering light to mid-grey. It is a resident bird. Size 105 ems.

4.6 Geology and Soils

4.6.1 Geology

The rocks of the dam site area are limited to the Tertiary and Pleistocene volcanic suite of central Kenya and are largely pyroclastic in origin and lava flows. Within the study area, the geological formation encountered range from grey and bleached agglomerates with Eutaxitic welded tuffs and sediments, Mau ashes with basal tuffs and are underlain at relatively shallow depths by Kericho Phonolites and Phonolitic nephnelites.

Nakuru Zone is part of the Rift Valley, a tectonic structure that makes up the main geological feature of Central Eastern Africa. The Rift Valley system has faults with a variety of orientations, and the principal structures adjacent to Nakuru. There is no direct evidence of any tectonic episodes prior to the tertiary period rift faulting. The tertiary and quaternary periods contain extensive faulting, where the main feature is normal faults characterized by steep hades, commonly near the vertical and as low as 60 degrees.

The geology of the Itare dam catchment area is characterized by three main geological units, these being volcanic rocks, the Bukoban system and alluvium. The Bukoban system, which is further divided into andesites, rhyolites, basalts and the volcanic rocks, which include phonolites, trachites and tuffs. The soil typology follows closely the underlying geology. The soils that are appearing in the volcanic foot ridges in the upper reaches as well as in the upper middle level uplands include: humic NITOSOLS; and mollic ANDOSOLS and Humic FERRALSOLS.

On the lower level uplands, RANKERS with LITHOSOLS and rock outcrops occur. On the lower middle uplands, eutric CAMBISOLS occur. In some places, these soils are gravelly and stratified and referred to as ferralic ARENOSOLS, and in other places orthic LUVISOLS.

The geology of the catchment area was reported on in 1971 (Jennings, 1971). This confirms that the entire catchment area on the Molo Plateau overlies Miocene Phonolites and Pliocene Phonolitic nephelinites with the former appearing as elongated outcrops fingering up the river valleys.

4.6.2 Soils

The residual soils covering the basin were found to extend to depths of about 4.0 meters in some places. Initial investigations classified these as Silty clayey SANDS of intermediate plasticity. Generally materials from these sources are dispersive, have high compacted permeability (in the order of 10^{-3} mm/sec), and are gravelly.

4.7 Climatic Conditions

The climate conditions of the area are strongly influenced by altitude and physical features. There is considerable variation in climate throughout the area. Rainfall is highest on the hills forming the Rift Valley escarpment; in the areas of Molo, Njoro, Elburgon and in Mau Forest.

4.7.1 Rainfall

Kenya's rainfall is highly variable, and mostly follows a bimodal cycle with two wet seasons except in the south-west of the country that has a uni-modal cycle where the short rains merge with the long rains. The long rains period from March to June contributes over 70% of the country's rainfall, while the unimodal extension from July to September or the bimodal short rains from October to December provide less than 20%. This seasonal rainfall is largely influenced by the Inter-Tropical Convergence Zone, which leads to considerable variability on the onset, duration and intensity of these rains.

Apart from precipitation along the coastal strip, Kenya's rainfall is correlated to topography with the higher regions annually receiving over 1800 mm, whilst the low plateaus receive only 320 mm per year.

Parts of south-western Kenya exhibit an extended uni-modal rainfall. This is the case for the Mau Plateau and hence for the Itare Dam catchment. Hence the period of the most pronounced rainfall commences in March and extends through September.

The results presented in the feasibility study report suggest an average annual rainfall over the catchment for the entire period (1944-2008) of about 1256 mm. Splitting this into two periods; 1944 to1980 and 1981 to 2008 suggests average annual rainfall totals of 1281 mm and 1230 mm respectively, with nearly 90% of the difference being accounted for in the period from March through July. This therefore tends to substantiate to some extend the analysis suggesting diminishing long rain period rainfall.

Rainfall ranges from 1800 mm to 2000 mm per annum with the wettest seasons being the months of April/May and July/August. The Figure 4-3 below shows the average monthly rainfalls for stations within and around the project area.

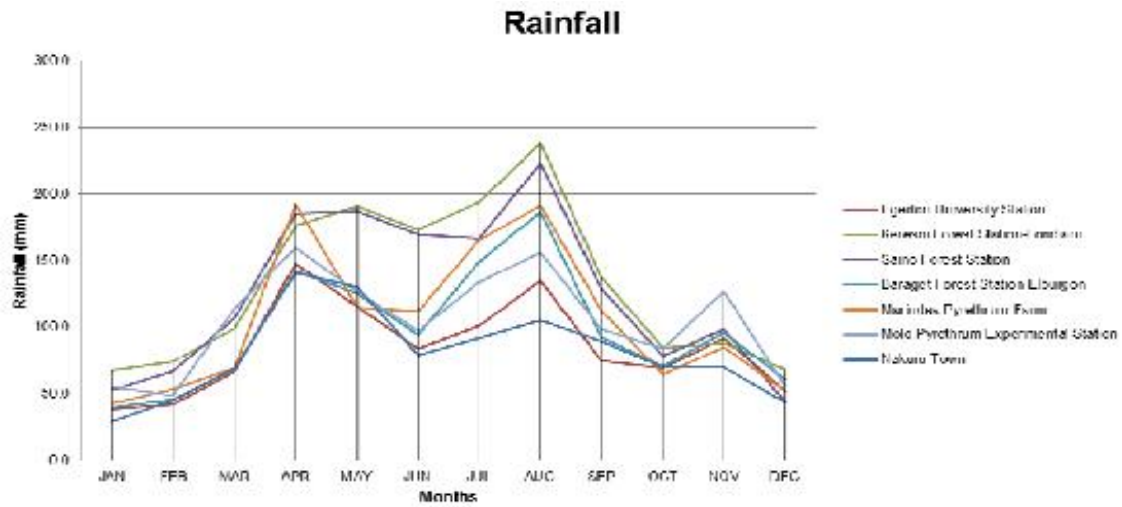


Figure 4-96: Average Monthly Rainfalls for Stations within and Around the Project Area

4.7.2 Temperatures

In general, mean temperatures in Kenya do not show wide variations throughout the year, although considerable seasonal spatial variations exist, these being largely attributed to altitude.

Temperatures range from minimum of 9°C in the high altitude areas of Molo Elburgon, Njoro and Mau Forest, to a maximum of 28°C in areas found at the floor of the Rift Valley, i.e. Nakuru and Salgaa town. The Figure 4-3 below shows the maximum, minimum and average monthly temperatures within the project area.

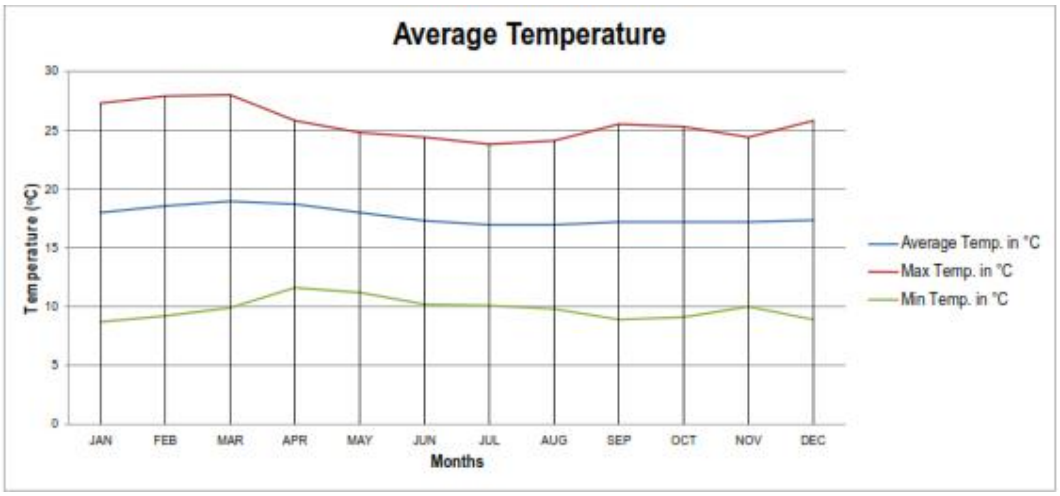


Figure 4-97: Monthly Maximum, Minimum and Average Temperature in Project Area

4.7.3 Precipitation and Evapo-transpiration

Mean annual evaporation rates from free water surfaces range in the country vary from 1250 mm to 3120 mm, with few areas having rates below 100 mm per month. Evaporation records relevant to this report are available from Egerton University have

been considered so as to establish monthly evaporation values for the Itare Reservoir and Catchment. These can be expected to slightly overstate the actual situation due to differences in elevation.

An excellent pre-climate change assessment of monthly and annual potential evaporation throughout Kenya was made in 1968 by Woodhead, based largely on sunshine hours and insolation.

4.7.4 Wind

The direction of wind in Kenya is predominantly from east to west, although the western parts of Kenya can also be affected by warm moist air originating over the Congo which may on occasions penetrate eastwards as far as Nairobi.

4.7.5 Droughts and Floods

The basic weather rhythm across Kenya is provided by the annual rainy seasons, which are linked to the movement of the Intertropical Convergence Zone (ITCZ). This refers to the band of clouds near the equator, which is formed by sunlight and excessive evaporation. With the sun high in June in the northern hemisphere and in December in the southern hemisphere, this band of clouds and the rain associated with it moves north- or southwards, respectively. Extremes of drought and flood apparently occur when this seasonal event is superimposed by the El Niño/La Niña Southern Oscillation (ENSO) phenomenon.

As a result, both droughts and floods are common phenomena in Kenya, and are triggered by similar factors. They can be either mild or disastrous and are more common and tend to be of longer duration in the arid and semi-arid parts of the country. Historically, maximum drought intensity (length or duration of a drought) ranges from 16 – 20 months in the drier areas down to 4 – 7 months in the wetter areas.

Severe drought events have been associated with the cold phase of ENSO, known as La Niña during which, there is marginal rainfall and strong winds across East Africa. Floods events have been associated with the warm, El Niño phase of the ENSO phenomenon associated with weak wind conditions and frequent rain.

During an El Niño event, the expected rainfall increase over most of the Lake Victoria catchment area is about 15–25%. However, due to anomalous warming of the western equatorial Indian Ocean during 1997 (the Indian Ocean Sea Surface Temperature Anomaly), strong convection developed over parts of the Horn and Eastern Africa. This resulted in a much larger 20–160% precipitation excess especially during the “short rainy” season.

4.7.6 Climate Change Scenarios

It is now generally accepted that while gradual climate change fluctuations are not new, the current abrupt climate changes are man-made, and an entirely new phenomenon.

The levels of naturally occurring greenhouse gases such as carbon dioxide and methane have been rising since the beginning of the Industrial Revolution in Europe and North America in the middle of the eighteenth century. For most meteorologists however, it was not until the late 1970s that it was realized that the result was man-made climate change and global warming and this was taking place on a historic rather than a geologic time scale and that this presented a danger in the very short term. This includes increased frequency of floods, droughts, storms and similar weather events, environmental degradation and decline in economic output in many parts of the world.

4.8 Seismology

The Seismic Zoning VI that the dam site falls under refers to the intensity of damage according to the Modified Mercalli. In that scale the intensity is defined as causing difficulty in walking, windows; crockery and glass break; knick-knacks, books etc. fall off shelves; pictures falling from walls; furniture moves or is overturned; weak plaster on walls cracks etc.

5 SOCIAL AND ECONOMIC SETTING

5.1 Population Trends and Water Demand

The project area is within Nakuru County, covering five constituencies which are: Kuresoi North, Molo, Rongai, Nakuru town west and Nakuru town east constituencies. Nakuru town is the head-quarter of Nakuru County. Molo and Elburgon towns are located in Molo constituency, while Njoro town in Njoro constituency. Salgaa is in Rongai constituency.

Nakuru town is divided into two constituencies which are; Nakuru town east and Nakuru town west constituencies.

The estimated water demand for Nakuru and en-route towns was projected to 2040 design horizon, based on the review of water demand undertaken in the 2012 Feasibility Study. The en-route towns considered under this project include Molo, Elburgon, Njoro and Salgaa/Rongai.

5.1.1 Nakuru Town and Peri-urban Areas

Nakuru town is strategically located to serve its hinterland. Its central location coupled with well-developed transport corridors to other urban centres, places it in an advantageous position over other towns in the province. In addition the town has a relatively well developed urban infrastructure.

This has enabled it to play a major role in the region. The town experienced sporadic influx of people after the post-election violence in 2007 when people opted to migrate from neighboring towns like Eldoret and Kericho and settled in Nakuru which is deemed to have more ethnic diversity. This migration has since then stabilized.

Preliminary design recommended that 85% of the water produced under Itare Dam Water Supply Project was proposed to supply Nakuru town and its peri-urban areas. 2009 census data and maps were used to identify the project area and determine the population growth. The target sub-locations within Nakuru and Nakuru North District were considered as the project supply areas. The Table 5-1 shows the target sub-locations and their population.

Table 5-1: Sub-Locations and Population in Nakuru and Nakuru North District

District	Division	Location	Sub-Location	2009 Population	No of Households	Household Size
Nakuru	Municipality	Kaptembwo	Kaptembwo	70,352	23,200	3.0
			Githima	17,989	5,182	3.5
			Mwariki	24,596	8,022	3.1
			Baharini	17,078	4,829	3.5
		Bondeni	Afraha	18,838	5,162	3.6
			Kivumbini	20,574	6,148	3.3
			Milimani	6,432	1,640	3.9
			Langalanga	31,733	9,674	3.3
		Viwanda	London	12,955	3,315	3.9
			Viwanda	4,196	1,297	3.2
		Ol Rongai	Barina	1,585	336	4.7
			Menengai	5,426	1,324	4.1
	Lanet	Lanet	Kiamunyeki	4,467	793	5.6
			Muguga	4,872	1,370	3.6
			Mwariki 'B'	9,937	2,486	4.0
		Free Area	Free Area	16,119	5,070	3.2
			Kiratina	14,254	4,239	3.4
			Menengai	18,672	5,139	3.6
	Baruti	Baruti	Baruti	2,819	639	4.4
			Parkview	2,287	503	4.5
			Kelelwet	1,675	342	4.9
		Kapkures	Mogoon	5,237	1,213	4.3
			Lalwet	1,936	398	4.9
			Ingobor	1,783	362	4.9
	Ngata	Kiamunyi	Mercy Njeri	5,715	1,544	3.7
			Olive	6,468	1,671	3.9
		Ngata	Ngata	3,544	964	3.7
			Kirobon	3,115	785	4.0
		Menengai	Kamugei	3,787	884	4.3
			Mangu	6,485	1,707	3.8
		Piave	Subuku	2,173	468	4.6
			Migaa	4,506	1,004	4.5
		Ogilgei	Milimani	1,600	390	4.1
			Ogilgei	3,956	879	4.5

	Lake Nakuru National Park	Lake Nakuru National Park	Lake Nakuru National Park	623	87	7.2
Nakuru North	Bahati	Kabatini	Kabatini	17,937	4,189	4.3
			Wendo	5,962	1,395	4.3
			Thayu	5,730	1,352	4.2
		Kiamaina	Kiamaina	11,327	3,040	3.7
			Rurii	10382	2738	3.8
			Workers	9636	2661	3.6
			TOTAL	**418,758**	**118,441**	**3.5**

With the proposed growth rate of 4.5%, and the 2009 population data for the project supply areas of Nakuru town and peri-urban areas; the population projections for 2012, 2018, 2020, 2025, 2030, 2035 and 2040 are as shown in the Table 5-2.

Table 5-2 Population Projections for Nakuru Town and Peri-urban Areas

Description	YEAR						
	2012	2018	2020	2025	2030	2035	2040
Projected Population	477,872	622,314	679,583	846,884	1,055,371	1,315,184	1,638,959
Growth Rate		4.5%	4.5%	4.5%	4.5%	4.5%	4.5%

The projected water demands for Nakuru Town and peri-urban areas based on the population projections for 2012, 2018, 2020, 2025, 2032, 2033 and 2040 are summarized in the Table 5-3.

Table 5-3 Water Demand for Nakuru Municipality and the Peri-Urban areas

Design Demands		Water Demand (m^3/day)						
Description	Factor	YEAR						
		YEAR 2012	YEAR 2018	YEAR 2020	YEAR 2025	YEAR 2032	YEAR 2033	YEAR 2040
Average daily consumption								
domestic		49,552	64,531	70,469	87,618	119,508	124,686	169,952
Institutional+commercial	2.0%	6,064	6,830	7,106	7,846	9,012	9,192	10,559
Total consumption		55,616	71,361	77,575	95,664	128,520	134,078	180,511
Average Network Losses	22%	15,687						
(over and above the 20%)	10%		7,929	8,619				
	5%				5,035	6,764		
	5%						7,057	9,501
Gross Network Demand (average)		71,303	79,290	86,194	100,699	135,284	141,135	190,012
Gross Network Demand (peak season)	1	**71,304**	**79,290**	**86,194**	**100,699**	**135,284**	**141,135**	**190,012**
Average Treatment Losses	5%	3,753	4,173	4,537	5,300	7,120	7,426	10,001
Gross Treatment Demand (average)		75,056	83,463	90,731	105,999	142,404	148,563	200,013
Gross Treatment Demand (peak season)	1.0	**75,057**	**83,463**	**90,731**	**105,999**	**142,404**	**148,563**	**200,013**

Based on recommendations, 85% of the water produced by Itare Dam Water Supply Project be supplied to Nakuru town and targeted peri-urban areas. Therefore, Nakuru is expected to receive about 85,500 m^3/day from Itare Dam. According to NAWASSCO estimates, the current water production for Nakuru is 50,000 m^3/day. This means that the existing and proposed sources will produce about 135,500 m^3/day.

5.1.2 En-route Towns

85% of the water produced under this project will be supplied to Nakuru town and peri-urban areas whilst the balance would be supplied to the en-route population. The principal en-route towns considered for supply are Molo, Njoro, Elburgon and Rongai/Salgaa. However, provision for envisaged future supply to Chepsir, Chepseon and Kedowa towns will also be provided. The balance to supply the en-route demand will be supplied to the principal towns in proportion to their estimated demands.

From the 2009 census data and maps published by the Kenya National Bureau of Statistics (KNBS), the Table 5-4 shows the target sub-locations and population for the principal en-route towns.

Table 5-4: Sub-Locations and Population in En-route Towns

District	Division	Location	Sub-Location	2009 Population	No of Households	*Household Size*
Nakuru	Rongai	Boror	Matuiku	2,397	542	*4.4*
			Chepseon	8,192	2,296	*3.6*
		Summek	Summek	2,773	619	*4.5*
			Mimwaita	1,470	333	*4.4*
		Visoi	Kandutura	5,756	1,324	*4.3*
			Kapkwen	4,839	1,118	*4.3*
		Rongai	Gicheha	2,793	856	*3.3*
			Umoja	3,380	988	*3.4*
		Lengenet	Moricho	3,922	839	*4.7*
			Lengenet	5,865	1,207	*4.9*
			Boito	1,790	445	*4.0*
Molo District	Molo	Molo	Matumaini	2,671	645	*4.1*
			Molo	32,315	8,664	*3.7*
		Sachangwany	Kabianga	2,858	636	*4.5*
			Sachangwany	5,254	1,215	*4.3*
	Elburgon	Elburgon	Arimi	8,184	1,826	*4.5*
			Elburgon	32,654	8,548	*3.8*
		Turi	Kiambiriria	8,151	1,850	*4.4*
			Turi	17,297	4,163	*4.2*
	Njoro	Njoro	Mukungugu	11,080	2,899	*3.8*
			Njoro	39,670	10,149	*3.9*
			TOTAL	**203,311**	**51,162**	***4.0***

Based on the proposed growth rates as detailed in the preliminary design report, and the 2009 population data for the project supply areas, the population projections for 2012, 2018, 2020, 2025, 2032, 2033 and 2040 are as shown in the Table 5-5.

Table 5-5: Population Projections for En-route towns

En-route Towns	Year						
	2012	2018	2020	2025	2030	2033	2040
Molo	46,684	54,776	55,944	62,011	69,478	72,657	84,613
Njoro	54,973	64,502	65,877	73,021	81,813	85,557	99,635
Elburgon	71,801	84,247	86,044	95,374	106,859	111,749	130,137
Rongai/Salgaa	46,770	54,877	56,047	62,124	69,605	72,790	84,768
Growth Rate		2.7%	2.4%	2.3%	2.3%	2.2%	2.2%

The projected water demand for the en-route towns are summarized in the Tables 5-6 to Table 5-9.

Table 5-6: Water Demand – Molo Town

Design Demands		Water Demand (m^3/day)						
Description	Factor	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR
		2012	2018	2020	2025	2032	2033	2040
Average daily consumption								
domestic		2,167	2,521	2,643	2,963	3,466	3,543	4,125
institutional+commercial	2.0%	76.5	89	92	102	117	119	137
Total consumption		2,245	2,610	2,735	3,065	3,583	3,662	4,262
Average Network Losses	40%	1,497						
(over and above the 20%)	20%		653	684				
	10%				341	398		
	10%						407	474
Gross Network Demand (average)		3,742	3,263	3,419	3,406	3,981	4,069	4,736
Gross Network Demand (peak season)	1.0	**3,743**	**3,263**	**3,419**	**3,406**	**3,981**	**4,069**	**4,736**
Average Treatment Losses	5%	197	172	180	179	210	214	249
Gross Treatment Demand (average)		3,939	3,435	3,599	3,585	4,191	4,283	4,985
Gross Treatment Demand (peak season)	1.0	**3,940**	**3,435**	**3,599**	**3,585**	**4,191**	**4,283**	**4,985**

Table 5-7: Water Demand – Elburgon Town

Design Demands		Water Demand (m^3/day)						
Description	Factor	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR
		2012	2018	2020	2025	2032	2033	2040
Average daily consumption								
domestic		2,623	3,263	3,442	3,857	4,514	4,613	5,373
institutional+commercial	2.0%	51	55	60	66	76	76	89
Total consumption		2,674	3,341	3,502	3,923	4,590	4,691	5,462
Average Network Losses	40%	1,916						
(over and above the 20%)	20%		835	876				
	10%				436	510		
	10%						521	607
Gross Network Demand (average)		4,790	4,176	4,378	4,359	5,100	5,212	6,069
Gross Network Demand (peak season)	1.0	**4,790**	**4,176**	**4,378**	**4,359**	**5,100**	**5,212**	**6,069**
Average Treatment Losses	5%	252	220	230	229	268	274	319
Gross Treatment Demand (average)		5,042	4,396	4,608	4,588	5,368	5,486	6,388
Gross Treatment Demand (peak season)	1.0	**5,042**	**4,396**	**4,608**	**4,588**	**5,368**	**5,486**	**6,388**

Table 5-8: Water Demand – Njoro Town

Design Demands		Water Demand (m^3/day)						
Description	Factor	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR
		2012	2018	2020	2025	2032	2033	2040
Average daily consumption								
domestic		2,785	3,236	3,395	3,804	4,452	4,550	5,300
institutional+commercial	2.0%	21	24	25	28	32	32	37
Total consumption		2,806	3,262	3,420	3,832	4,484	4,582	5,337
Average Network Losses	40%	1,871						
(over and above the 20%)	20%		816	855				
	10%				426	498		
	10%						509	593
Gross Network Demand (average)		4,677	4,078	4,275	4,258	4,982	5,091	5,930
Gross Network Demand (peak season)	1.0	**4,677**	**4,078**	**4,275**	**4,258**	**4,982**	**5,091**	**5,930**
Average Treatment Losses	5%	246	215	225	224	262	268	312
Gross Treatment Demand (average)		4,923	4,293	4,500	4,482	5,244	5,359	6,242
Gross Treatment Demand (peak season)	1.0	**4,923**	**4,293**	**4,500**	**4,482**	**5,244**	**5,359**	**6,242**

Table 5-9: Water Demand – Rongai/Salgaa Town

Design Demands		Water Demand (m^3/day)						
Description	Factor	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR
		2012	2018	2020	2025	2032	2033	2040
Average daily consumption								
domestic		1,994	2,319	2,431	2,723	3,188	3,258	3,793
institutional+commercial	2.0%	30	34	36	39	45	46	53
Total consumption		2,024	2,353	2,467	2,762	3,233	3,304	3,846
Average Network Losses	40%	1,349						
(over and above the 20%)	20%		588	617				
	10%				307	359		
	10%						367	427
Gross Network Demand (average)		3,373	2,941	3,084	3,069	3,592	3,671	4,273
Gross Network Demand (peak season)	1.0	**3,373**	**2,941**	**3,084**	**3,069**	**3,592**	**3,671**	**4,273**
Average Treatment Losses	5%	178	155	162	162	189	193	225
Gross Treatment Demand (average)		3,551	3,096	3,246	3,231	3,781	3,864	4,498
Gross Treatment Demand (peak season)	1.0	**3,551**	**3,096**	**3,246**	**3,231**	**3,781**	**3,864**	**4,498**

A summary of en-route town gross network demand is shown in Table 5-10.

Table 5-10: En-route Towns Gross Network Demand Summary

En-route Towns	Water Demand Summary							% of Total
	2012	2018	2020	2025	2032	2033	2040	
Molo	3,743	3,263	3,419	3,406	3,981	4,069	4,736	23%
Elburgon	4,790	4,176	4,378	4,359	5,100	5,091	6,069	29%
Njoro	4,677	4,078	4,275	4,258	4,982	5,212	5,930	28%
Salgaa/Rongai	3,373	2,941	3,084	3,069	3,592	3,671	4,273	20%
Total	**16,583**	**14,458**	**15,156**	**15,092**	**17,655**	**18,043**	**21,008**	

Table 5-11 gives a summary of the water demand for Nakuru town, its peri-urban areas and the en-route towns.

Table 5-11: Water Demand Summary

Project Towns	Water Demand Summary						
	2012	2018	2020	2025	2032	2033	2040
Nakuru town & Peri-Urban Areas	71,304	79,290	86,194	100,699	135,284	141,135	190,012
En-route Towns	16,583	14,458	15,156	15,092	17,655	18,043	21,008
Total	**87,887**	**93,748**	**101,350**	**115,791**	**152,939**	**159,178**	**211,020**

Table 5-12 gives a summary of the existing and expected water production from the operating and planned water facilities for the project towns.

Table 5-12: Water Production Summary

Project	Water Production (m^3/day)		
Areas	Existing	Planned (Itare)	Total
Nakuru	50,000	85,500	135,500
Molo	775	3,350	4,125
Elburgon	460	4,650	5,110
Njoro	415	4,800	5,215
Salgaa/Rongai	3,010	700	3,710
Total	**54,660**	**99,000**	**153,660**

From the above tables it is deduced that the existing and planned facilities will meet the water demand for the project towns up to 2032. This allows the balance of about 1,000 $m^{3/}$day supply to other en-route areas such as Kedowa, Chepsir and Chepseon.

5.2 The Water Supply Situation

5.2.1 Nakuru Water Supply System

The Nakuru schemes use both surface and groundwater sources. Under the Rift Valley Water Supply and Sanitation Project financed by the GoK and African Development Bank (AfDB), rehabilitation works for the existing water supply system was undertaken. The objective of the project aimed at rehabilitating and augmenting the water supply to meet the 2010 water demand. Under the project, the Olobanita Wellfields with 6 No. boreholes was developed to complement the existing sources of water supply for Nakuru town.

On completion of the Nakuru Works Programme, the total capacity of the water supply was anticipated to be 61,000 m³/day. However, based on the average monthly production data indicated in the NAWASSCO monthly reports, the average water produced under the rehabilitated water supply status i approximately 33,000 m³/day. On further consultation, NAWASSCO confirmed the average monthly production of nearly 50,000 m³/day.

5.2.2 Existing Water Supply in Molo

Molo Town is served from two inter-connected water supply systems. These are the Nguso Springs located 3 km off the Road to Rongai and boreholes which are located within Molo Township.

The borehole water supply system involves pumping groundwater, via an 80 mm AC rising main to two storage tanks each of 100 m³, located at the Area Water Office. From the tanks the water gravitates to the supply areas. Additional boreholes were drilled and a DN 100/200 delivery manifold pipeline of nearly 1.8 km was laid to deliver water to the high level tanks. A chlorination building was also constructed under the recently completed project.

The Nguso Spring is located approximately 3 km off the main road to Rongai / Nakuru. Previous studies indicate that the spring produces approximately 5,000 m³/day, of which approximately 700 m³/day is pumped to Molo town. The rest of the production is gravitated to the rural areas of Nakuru town. Nguso spring water is chlorinated and pumped to the booster station in Kibunja where it is further pumped to the high level

tanks in Molo town. Water then gravitates to the distribution system and also supplies the tanks at the Area Water Office.

5.2.3 Existing Water Supply - Elburgon

Elburgon town received its water supply from three boreholes located within Elburgon Township and Rongai South Water Supply System. Water from two boreholes (at Marishoni and in town) is pumped to the 100 m^3 tank, via two DN 80 GI rising mains from each borehole, which later merge to form a single rising main of the same diameter to the tank.

Water from the third borehole (Salvation Army boreholes) delivers water through a DN 150 pipeline up to the 3,000 m^3 high level tank. Water is chlorinated at the tank and then gravitates to the area of supply through a distribution network constituting uPVC and GMS mains with diameters varying from OD 13 to DN 80. The Rongai South Water Supply System also supplies water to Arimi area.

5.2.4 Existing Water Supply - Njoro

Njoro town is presently dependent on both surface water and groundwater supply systems. The town is being supplied by four boreholes. Two of the boreholes are located within town i.e. at the Njoro Golf course and the second is next to the fuel station whilst the other boreholes are located between Njoro town and Ngata farm. The Njoro Golf Course borehole pumps water to a conventional treatment plant where chlorination is done, the water is stored in 225 m^3 tank before it flows by gravity into the distribution system. Some of it is pumped into 65 m^3 elevated tank at the treatment plant, to serve areas around the Golf course. The other boreholes pump water to a collector tank at Shell Pumping Station where chlorination is done. After chlorination the water is pumped to elevated tanks at the station which then gravitates to the distribution system. The distribution system comprises approximately 20 km of pipelines of diameters varying DN 150 to DN 50 and below. The existing pipes comprise mainly of uPVC and GI pipes.

The newly constructed pumping station comprises of a 250 m^3 collector tank, pump house and control building, chlorination building and other support facilities. There are two elevated tanks at the pumping station with a capacity of 45 m^3 and 150 m^3. Rongai South System supplies surface water to parts of Njoro town and its environs. The system is located in Rongai area of Nakuru district. It produces about 20,000 m^3/day of water. Most of the water is supplied to areas in Nakuru rural and the remaining is supplied to Njoro. Some of the areas supplied from this system include Ng'ondu, Kamwago, and Jirani.

There is a conventional treatment works which was constructed in 1981 with a design capacity of 2,160 m³/day to treat water abstracted from Njoro River. However, an abstraction license was not issued since Njoro River is the main supply to Lake Nakuru.

5.2.5 Existing Water Supply - Rongai/Salgaa

Salgaa town is supplied from Nguso springs via an off-take from the main line heading to Rongai area. Nguso springs are located approximately 3 km off the main road to Rongai / Nakuru. Previous studies indicate that the spring produces approximately 5,000 m³/d, of which approximately 700 m³/d is pumped to Molo town. The rest of the production is gravitated to Salgaa, Rongai and other rural areas of Nakuru town.

5.1 Education

Nakuru County is also an important educational centre. It is the home of Egerton University, a large public university situated near Njoro town, Kabarak University (a private university), Rift Valley Institute of Technology, Kenya Industrial Training Institute (KITI) and many other institutions of higher learning.

Based on 2009 census data, about 90.17% of the population in the project area ((Nakuru, Nakuru north and Molo Districts) have attended school (source KNBS), While 9.8% of the population have never attended school. Urban areas have registered high number of school attendance than the rural areas.

5.2 Health

There are a number of health facilities within the County, ranging from Provincial Hospital to Maternity/Nursing Homes. Just 37% of them are government-run. The largest hospital is the Ministry of Health's- Rift Valley Provincial General Hospital located in Nakuru Town East Constituency with a bed capacity of 620.

5.3 Social and Cultural Setting

Itare Dam is proposed to be constructed in Kuresoi North Constituency, which is predominantly occupied by the Kipsigis people. However, in the southern parts of the Constituency especially around Kamwaura and Sitoito the Kipsigis live side by side with the Kikuyu and Abagusii settlers in the settlement schemes on the former White Highlands. The area is thus a complex social mosaic that has posed social tensions between people from the different ethnic groups mainly over land and cattle. The Kipsigis are a Nilotic group that are part of the wider Kalenjin ethnic group. Their main source of livelihood is cattle.

Traditionally they were nomadic pastoralists. However, following colonization, they transformed into sedentary agriculturalists focusing on tea, maize, pyrethrum and bean growing as well keeping good herds of dairy cattle introduced to them by the colonialists.

However, due to logistical problems including bad roads, they do not grow any cash crop mainly tea which does well in the region. Pyrethrum growing is also not a widespread activity. Cattle rearing are widespread and it's highly valued in the region.

This socio-cultural background has implication for resettlement action planning in the sense that although women are worst hit by loss of land as the primary farmers, they do not own it legally and are likely to be overlooked in the compensation process unless their interests are considered - even if informally. Equally their consent for a project such as of work may have to be negotiated with their male spouses as they may not have legal command over land although they are major beneficiaries of water projects such as the Itare Dam. This applies to the Kikuyu and Abagusii farmers and business people that will be affected by the pipeline route on its way to Nakuru. Although they are Bantu groups the Kikuyu and the Abagusii men hold land in trust for their sons and women are largely excluded from ownership in the family line

5.4 Institutions and Development Agencies

Service delivery infrastructure exists along the proposed alignment. Such infrastructural facilities include water pipelines adjacent to or crossing over proposed pipeline alignment route, sewers, national trunk or urban roads, railway line, power transmission lines and power transformers, fiber-optic cables, oil pipelines and storm water drainages may be affected by the Project.

5.5 Economic Setting

5.5.1 Agricultural Activities, Livestock and Fishing

The main economic activity in Kuresoi and Molo constituencies is agriculture, given that these are basically rural economies. People grow maize, beans, an assortment of vegetables, pyrethrum, potatoes, Napier grass, trees and fruits mainly avocados. They also rear dairy cattle and for that reason significant portions of their land are under pasture.

Overall, the fulcrum of the economies of the two constituencies includes milk and maize. Nonetheless, parts of Molo constituency are occupied by large scale Irish potato and wheat growers and parts of Kuresoi host some tea growing.

5.5.2 Natural Resources

Hyrax Hill Prehistoric Site, discovered by the Leakeys in 1926, is considered a major Neolithic and Iron Age site. The adjoining museum features finds from various nearby excavations.

Tourism is a major source of revenue for Nakuru. Lake Nakuru is one of the Rift Valley soda lakes, which forms part of the Lake Nakuru National Park. The park has large numbers of flamingos that can be seen foraging in the shallow lake. The park also has many wild animals that can be seen during a safari. Apart from the animals numerous other sites of interest are accessible from Nakuru. These include Menengai Crater, a dormant volcano. Small fumaroles and steam vents can regularly be observed within the forested caldera from above. The second largest surviving volcanic crater in the world, it plunges 483 m down from the rim and the summit is accessible by foot or vehicle. The wood covered crater ground is a nature reserve.

5.5.3 Commerce

Nakuru town presents a mixed bag of economic activities. The Nakuru Municipality brings an urban economy with industries and commercial activities. The main industries in the town include Eveready Industries producing dry cell batteries and spot lights, Menengai cooking oil refinery, maize and wheat flour factories, water packaging factories and many others. The main commercial activities include retail and wholesale shops, tourist hotels and restaurants, petroleum products outlets, schools, middle level colleges and universities.

Another segment of commercial activities include the service industry offering banking, health and insurance services.

5.5.4 Sports and Leisure

The Rift Valley Sports Club lies in the centre of the town. A number of sporting activities are hosted at this club and popular among them is cricket. The local Indian community can be found at cricket fixtures throughout the year. The town hosts an annual rugby festival dubbed "The Great Rift 10-a-side" which features teams from across the East Africa region.

5.5.5 Infrastructure and Communication

Nakuru town and Salgaa are accessible by A104 road traversing through them. Nakuru town has a good number of avenues and streets. The Kenya Uganda railway line passes through the towns of Nakuru, Njoro, Elburgon and Molo, with a railway station

in each town. This has facilitated the movement of agricultural products from Molo, Elburgon and Njoro, and the industrial manufactured goods from industries located in Nakuru town. Njoro – Molo road connects the three towns of Njoro, Elburgon and Molo and it ends at the B1 road.

Communication sector in the area has tremendously improved since the emerging of the mobile phone. The mobile service providers in Kenya have provided the entire necessary infrastructure up to rural areas making it possible for people to use their mobile phones. The major towns have post offices and a number of internet access points.

The foregoing are some of the economic activities that will benefit from the Itare Dam project. In particular, major population centres such as Molo, Elburgon, Njoro and Nakuru which have major residential areas of an urban nature will receive water that is badly needed to spur economic growth in the County.

6 PUBLIC CONSULTATIONS AND STAKEHOLDER MANAGEMENT

Good practice in ESIA requires Public Consultations be actively held with relevant regulatory bodies, experts, affected communities and other interested and affected parties. The aim is to inform them about the developing plans and give them an opportunity to express their views on the Project and its impacts, so that these can be taken into account in developing the Project proposals and in assessing and mitigating impacts. Consultation is also invaluable in identifying useful information on the baseline situation and on vulnerable resources and receptors in the study area.

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

The Kenya government has enshrined the need for human societies' involvement in project development in the Constitution. This has also been set out in the EMCA, 1999 and Environmental (Impact Assessment and Audit) Regulations, 2003. Community consultation and participation ensures that communities and stakeholders are part and parcel of the proposed developments and in so doing assures the sustainable use of resources. It has also demonstrated successfully that projects that go through this process will acquire high level of acceptance and accrue benefits to a wider section of the society.

6.1 Benefits of Public Consultations and Stakeholder Engagement

6.1.1 Benefits to the Proponent

The following public consultation benefits are associated with to the proponent:

- ✓ The proponent will benefit from the local knowledge;
- ✓ Costs may be saved as key issues are identified by the public and studies are focused on key issues as opposed to a broad range of issues;
- ✓ Measure to reduce impacts and enhance benefits will be identified with stakeholders;
- ✓ Relations with the communities in the vicinity of the development will be improved;
- ✓ Delays in decision making may be reduced because of good public participation early in the project planning process;
- ✓ The public are unlikely to raise objections to the project; and
- ✓ The proponent's image and reputation will be enhanced.

6.1.2 Benefits to Civil Society and Public

The following public consultation benefits are associated with the Civil Society and Public:

- ✓ Capacity is built through people playing an active role during the process. The skills learnt can be used in other community projects;
- ✓ Civil Society and the public rights are exercised and projected by participating; and
- ✓ Inputs will influence the form and nature of the development and is likely to lead to better development that takes societies needs into account.

6.1.3 Benefits to Decision Makers

The following public consultation benefits are associated with the decision makers:

- ✓ Public participation will improve decisions since there is access to a broader range of perspectives and opinion on the proposed development;
- ✓ The development is likely to be more sustainable as it takes people's needs and views into account; and
- ✓ Governance and the legitimacy of the government will be improved e.g. NEMA will have easy time deciding whether to grant a license.

6.2 Public Consultations Held

6.2.1 Public Consultations during Inception Study

The following is a list of people met during the inception study of the project in May 2012:

No.	NAME	POSITION	ORGANISATION
1	Eng. Japheth Mutai	Chief Executive Officer	Rift Valley Water Services Board
2	Eng. H.K Cheruyot	Assets Development Manager	Rift Valley Water Services Board
3	Anastasia Gitau		Rift Valley Water Services Board
4	Eng. Matagoro W.O	Regional Manager	Water Regulatory Management Authority
5	Simon Mwangi	Service Water Officer	Water Regulatory Management Authority
6	Job K. Tomno	Managing Director	Nakuru Rural Water and Sanitation Company
7	Peter K. Ndiema	Project Manager	Nakuru Rural Water and Sanitation Company
8	Stephen Ndiama	Operation Manager	Nakuru Rural Water and Sanitation Company
9	Samuel Mwaura	Municipal Engineer	Nakuru Municipal Council
10	Vincent Obonyo	Regional Co-ordinator	Kenya National Bureau of Statistics (Nakuru)
11	John Cox Lorionokou	Constituency Electoral coordinator	Independent Electoral and Boundary Commission
12	Mr Macdonald Obudho	Director, Population and Social Statistics	Kenya National Bureau of Statistics

13	Mr Andrew A Imbwaga	Manager, Population & Social statistics	Kenya National Bureau of Statistics

The information obtained from these consultations formed the basis of other information search such as the extent of demographics affected, maps of the study area and design of further public consultations.

6.2.1 Public Consultations during Detailed Design Stage

A cross-section of persons was consulted through Key Informant Interviews (KII). The Key Informant Interviews were primarily targeted to personnel from lead agencies based within the vicinity of the dam site and area traversed by the pipeline, the local administration and opinion leaders as well as the immediate neighbors to the facility. A structured Checklist was used to explore the issues.

The following is a list of the Persons consulted in planning the ESIA for the Itare Dam and Water Supply Project during the Detailed Design Stage of the project:

S. No.	Date of Consultations	Designation	Name	Telephone Contact
1	28th August 2012	Assistant Chief – Chematich Sub-Location	John K Mutai	0722-336862
2	28th August 2012	Aspiring Councillor	Janet Tonui	0729-699366
3	12th October 2012	Assistant County Forest Coordinator, Nakuru	MacOdero Sylvester	0721689811
4	12th October 2012	District Public Health Officer Kuresoi District	Anthony T. Tarus	0722-943875
5	12th October 2012	District Forest Officer Kuresoi District	Peter N Nyabuti	0722-556697
6	13th October 2012	Chief – Kimasian Location	Charles Too	0721-714705
7	13th October 2012	Assistant Chief – Chesinende Sub-Location	John Kosgei	0724-357658
8	13th October 2012	Assistant Chief – Chepsir Sub-Location	Joseph Kirui	0723-103772
9	13th October 2012	Area Councilor - Kedowa	Stanley Michael Cheruiyot	0720-212920
10	13th October 2012	Assistant Chief – Kipyemit Sub-Location		0722-451691
11	13th October 2012	Chief – Kimugul Location	Sang	0722-943021

The following is the register of consultation and the findings.

d) Overview from the Assistant County Forest Coordinator, Nakuru County

The current forest cover situation is as follows:

- ✓ The Nakuru Forest zone in Nakuru County initially had a gazetted forest area covering 136,046 ha. This has changed with time following several excisions.
- ✓ The areas remaining approximately consist of 48,650.90 ha Natural forest, 7,456.10 ha plantation forest, 5,297.0 ha bamboo, 4,402.9 ha, and 5,953.5 ha grassland giving a grand total of 71,760.4 ha of forest area.

- ✓ The tree species in the area include *Podocarpus ficifolia, Prunus africana, Olea africana, Pinus patula, Cupressus lusitania, olea europaea,* and *Warbuggia ugandensis.*
- ✓ The proposed project components occupy an area of about 1,376 ha consisting of 55 ha of natural forest, 436 ha of plantations and 885 ha of grassland.

Environmental challenges affecting the area are as follows:

- ✓ Deforestation
- ✓ Clearing of forests for farming land
- ✓ Cutting of trees for firewood, charcoal and building materials
- ✓ Endangered tree species such as *Prunus africana, Olea europaea, and Warbuggia ugandensis.*

Current efforts by the Ministry to encourage forest conservation:

- ✓ Sensitization of the communities neighboring the forest against deforestation
- ✓ Promotion of tree farming in the farms (agroforestry).
- ✓ Introduction of related income generating activities.
- ✓ Strengthening Community forest associations.
- ✓ Advocacy on the forest conservation.

Some expectations regarding the Itare Dam and Water Supply Project are :

- ✓ Some trees will have to be felled for the pipeline leading to loss vegetation and biodiversity
- ✓ Availability of good quality water to various stakeholders
- ✓ Creation of employment opportunities for the local community.

Recommendations to improve the project:

- ✓ Pipeline layout should be planned in a way that causes minimal disturbance to the existing forest cover

a) Overview from the District Public Health Officer, Kuresoi District

An overview of the public health status is as follows:-

- ✓ Total number of health institutions: 24 public, 8 private
- ✓ Available personnel: 5 doctors, 47 nurses, 4 lab Technologists and 15 PHOs
- ✓ Most prevalent health problems are Malaria, Typhoid and HIV/AIDs, in that order
- ✓ Health problems mainly caused by poor sanitation and poverty
- ✓ NGO-based health institutions include Tenwek and Red Cross

- ✓ Average distance to health institutions is about 15 km.
- ✓ Food security status is generally good and there are no major challenges regarding food supply in the area

Some expectations regarding the Itare Dam and Water Supply Project are:

- ✓ Improved health status of the people in the area
- ✓ Reduced incidence of typhoid in the area due to improved water supply
- ✓ Improvement in the general sanitation status of the residents
- ✓ Improved standard of living of the residents

Recommendations to improve the project:

- ✓ There should be adequate measures for provision of water to the residents within the project area.

b) Overview from the District Forest Officer, Kuresoi District

- ✓ Total forest coverage in the district is about 15,000 ha
- ✓ Main challenges with regard to forests in the area include deforestation, clearing of forests for farmland, as well as cutting of trees for firewood, charcoal and building materials
- ✓ Ministry efforts to counter these challenges include conduction of sensitization campaigns to protect the existing forest cover as well as provision of tree seedlings for reforestation and planting on farm lands.
- ✓ Other efforts directed at encouraging forest conservation include involving the community in forest conservation and protection through formation of CFA's (Community Forest Associations) and provision of technical advice.

Some expectations regarding the Itare Dam and Water Supply Project are:

- ✓ Some reduction in vegetation cover to facilitate layout of the facilities
- ✓ Might expose the forests to illegal logging
- ✓ Improved availability of water for tree seedling production
- ✓ The routes to the project facilities will provide access for easy patrols within the forest

Recommendations to improve the project:

- ✓ The layout of the project components should be such that sensitive ecosystems are not affected such as sections populated with endangered species.

c) Overview from all the other local leaders (chiefs, councillors)

The key issues associated with a water supply dam and pipeline project vary but will often relate to biodiversity, heritage, pollution control, disruption of livelihoods, community safety, and employment and trade opportunities.

Generally, the leaders confirmed the following:-

- ✓ Highly supportive of the project
- ✓ Their expectations are that the residents in the vicinity of the dam and the areas immediately bordering the pipeline will benefit from piped water supply
- ✓ Recommend focusing on local sources of unskilled and semi-skilled labor for the project implementation

6.3 Public Consultations to be held

Following the completion of the detailed designs in November 2013, the RVWSB in august 2014 awarded a tender for an ESIA study compliant with EMCA that will lead to the application and issue of an EIA license so that works can commence.

6.3.1 Approach

In carrying out the Public Consultations for the proposed project, so far the strategy used has been to visit the would-be affected land owner at his/her residence to inform and discuss the proposed Project. Going forward there will be need for public meetings (barazas) so as to make the larger community buy into the project.

Further consultations will most likely need to adequately address the following pertinent issues:

- ✓ Wayleave realignment;
- ✓ Compensation;
- ✓ Water allocations;
- ✓ Project construction logistics;
- ✓ Services disruption; and
- ✓ Major installations crossing.

These consultations will be done:

- ✓ Prior to commencement of construction;
- ✓ During construction phase; and
- ✓ During operation phases.

6.3.2 Likely Stakeholders

In the estimate of the Consultant, stakeholders who could be included in the Construction and Operation of the Project include but are not limited to the following;

- ✓ PAPS - Affected communities neighboring the sites of proposed project including land owners, businesses and water users in the project area
- ✓ RVWSB as the Proponent
- ✓ Lead Agencies e.g. KFS, KWS, Kenya Prisons Service
- ✓ Respective County Representatives i.e. Nakuru, Kericho such as governors and commissioners
- ✓ MoEWNR representatives - Water Officers, Environmental Officers, Mining Officers for Kuresoi, Kericho and Nakuru Districts
- ✓ WRMA - Regional Managers for Water Resources Management Authority (WRMA) – Lake Victoria catchment
- ✓ Design Consultant
- ✓ Appointed Contractor
- ✓ Interest Groups e.g. Environmental lobby groups
- ✓ Service providers in the region, for example, health, education, training, emergency services

7 POTENTIAL IMPACTS OF THE PROJECT ON ENVIRONMENTAL AND SOCIAL VALUES

7.1 Potential Impacts of the Project on Environmental and Social Values

7.1.1 Employment Opportunities

Construction employment will depend on the construction methods adopted by the contractor(s). Recent dam developments in Kenya have employed tens of thousands of workers but with increased mechanization this figure could be substantially reduced.

The project will require skilled and unskilled labour throughout planning, construction, operation and even decommissioning phases.

Economically, it means abundant unskilled labour will be used in production. Socially these people will be engaged in productive employment and minimize social ills like drug abuse and other antisocial activities.

With use of labour intensive construction technologies where appropriate, the project will provide employment for youths and provide support to the Government of Kenya's initiatives on creation of jobs.

After the completion of construction, there will be some 100 permanent jobs associated with the running of the treatment works, power station and the maintenance of the dam. This constitutes a major benefit. The proponent should explore ways of having the project sponsor youth in dam area to be trained on dam and treatment works operations and maintenance.

7.1.2 Creation of a Market for Construction Materials

The Project will require materials, some of which will be sourced locally and some internationally. The materials to be sourced locally include: cement, sand, hardcore and pipes. Those to be sourced outside the country include fly ash and mechanical fittings. These will provide a ready market for suppliers in and outside the country.

7.1.3 Settlements

An estimate of the construction labor force might be 6,000-10,000 persons. Clearly this will have a major economic and social impact on the many townships along the Pipeline route as well as cause new settlements in the dam area.

It will bring new expenditure in to the townships and create new economic opportunities for local people. This will constitute a significant positive impact.

There will also be a need to minimize human intrusion into the Ndoinet Forest Reserve.

7.1.4 Services

Many services and facilities (such as schools, clinics, churches etc.), especially in Ndoinet, will have to be expanded and upgraded to meet the needs of the incoming population. This could constitute a significant benefit for the local community.

7.1.5 Commerce

Commerce will flourish especially if recreational use of the dam is feasible. Activities such as fishing, boating and picnicking will diversify household incomes for residents around the dam area.

The reservoir will provide a potential resource for the development of aquaculture. Care will need to be taken to avoid introducing species that will upset the local ecosystem. Nevertheless this is a potentially significant positive impact.

7.1.6 Social Problems

However, the presence of a large workforce will also create potential social problems e.g. stealing, irresponsible sexual behavior, and will increase the likelihood of intrusion into the Forest Reserve.

7.1.7 Infrastructure

It is perceived that improved accessibility to Ndoinet and easier transportation around the reservoir may open up significant agricultural potential of the dam area as well as tourism. This would require determined planning and investment and care be taken not to conflict with the objectives of the Forest Reserve.

It will benefit farmers in the area whose produce never gets to markets due to poor condition of roads.

7.1.8 Workers Accidents and Hazards during Construction

Construction workers are likely to have injuries and hazards as the construction works unavoidably expose workers to occupational health and safety risks. The workers are also likely to be exposed to risk of accidents and injuries resulting from accidental falls, injuries from hand tools and construction equipment.

7.1.9 Residents' Accidents and Hazards during Operation

There is risk of people drowning in the reservoir. These could be young children seeking adventure or drunks who lose their way at night.

7.1.10 Extraction and Use of Construction Materials

Construction materials that will be used in the construction such as hard core, cement and rough stone will be obtained from quarries, hardware shops and sand harvesters who extract such materials from natural resource banks such as rivers and land. The proposed development is being carried out at a scale that can create considerable damage to the environment due to materials extraction. Such damage will include but not limited to damaging landscape aesthetics, destruction of forests among others.

7.1.11 Death and Injuries As A Result Of Tampering with the Pipeline

Those tampering with the valves on the pipelines are likely to be hit by the high pressure transmitted water leading to death and injuries of those tampering with the valves on the pipeline.

Decommissioning impacts are closely related to the reason for the decommissioning and include but are not limited to:

- ✓ Employment opportunities.
- ✓ Loss of potable water for residents;
- ✓ Noise and vibration;
- ✓ Generation of waste;
- ✓ Dust emission; and
- ✓ Land use changes.

7.2 Potential Noise Impacts

The land use immediately surrounding the Project corridor is primarily rural in nature except for the region within Nakuru Municipality and the small market centres along the pipeline. Background noise levels are low, consistent with this type of land use. In towns, major noise sources include existing traffic on major highways, business activities such as Juakali, entertainment spots, and hawking. In Rural setup noise sources will comprise wind, domestic animals and wildlife in areas traversed by the dam and pipeline.

Introduction of new sources of noise to a previously dormant environment is an issue in areas where ambient noise levels have been low. This will be a short term impact that will end with the construction phase. There will be constant noise during construction especially from machinery and workforce.

Intermittent noise may arise from maintenance activities and vehicles during the operation phase. It will also increase human settlement and commerce which will result in increased noise levels in the dam area and areas hitherto relatively quiet.

Impacts on this environmental quality will be short term lasting over the construction period. Likely sources will be;

7.2.1 Construction Equipment

Potential noise and vibration impacts during construction will arise from construction equipment and activities, mainly occurring at the embankment, treatment works, pipeline alignment, quarries and borrow sites. These will be short term, most likely occurring during daytime.

Noise impacts may also occur along roads and tracks used to bring materials and equipment to the Project. This type of noise will be short term and intermittent.

7.2.2 Workers' Camps

There may be some noise associated with temporary and permanent construction camps but this is unlikely to cause any significant disturbance.

7.2.3 Tunneling Activities

Vibration related impacts are anticipated especially where blasting operations will be required. These include;

- ✓ Quarry operations
- ✓ Shaft sinking in tunneling and
- ✓ Tunneling through either D&B or TBM methods
- ✓ Demolitions by implosion

The vibrations can cause structural damage to nearby buildings.

7.2.4 Operation Phase Impacts

During operations, there will not be much noise except from maintenance activities. Wave action in the lake produces pleasant sounds especially at night. Such kind of noise is not normally taken to be a nuisance.

7.3 Potential Air Quality Impacts

Baseline carbon dioxide emissions are those stemming from the burning of fossil fuels from vehicles. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas. The landscape along the Project's Corridor of Influence (CoI) is rural with the majority of the existing sources of emissions derived from:

- ✓ Products of fuel combustion from vehicles and equipment; smoke from agricultural waste and pastureland burning;
- ✓ Wind erosion;
- ✓ Quarrying activities; and
- ✓ Vehicle movements on earth roads.

There may be sensitive receptors within 100m of the proposed pipeline alignment especially in the urban centers. In addition, farm workers and pastoralists may come within 50m of the alignment during construction. The alignment passes close to some areas of vegetation that may be sensitive to dust deposition.

The project is likely to introduce air pollutants at its fixed facilities. Particulate matter, particularly in the repairable range of concern is dust.

7.3.1 Dust or Particulate Matter (Pm)

The most common pollutant involved in fugitive emissions is dust or Particulate Matter (PM). This is released during certain operations, such as transport and open storage of solid materials, and from exposed soil surfaces, including unpaved roads.

Construction impacts relate largely to dust emissions from:

- ✓ Construction machinery
- ✓ Vehicle movements over unsealed surfaces; though these emissions from construction vehicles and equipment are not likely to contribute significantly to degradation of environmental values in relation to air quality.
- ✓ Exposure of soils to wind erosion.
- ✓ Wind erosion of open active areas.
- ✓ Material handling and temporary stockpiles;
- ✓ Spoil transportation; and
- ✓ Small concrete batching plant activity

7.3.2 Air Emissions

Potential sources of air emissions from the construction and operation phase of the project include exhaust emissions from diesel powered equipment that contributes to health effects (especially cardiovascular) and global warming.

7.4 Potential Impacts on the Water resources Management and Water Quality

Dams are a major tool for water resources management world over. Construction of a dam effects variations in discharges and water levels. The discharge regime becomes more regular compared to the conditions without dam and both low and high discharges occur less frequently. Hydrological changes in the river system may lead to greater area of influence both upstream and downstream. The stream morphological features may also change with time.

Rivers are a vital link in the hydrological cycle of water systems. They carry water from the river basin downstream to the lake/oceans and support fish and wildlife habitat.

Our societies and ecosystems depend on these functions of a river. Conservation of the natural habitat is thus a vital part of the design of a dam project.

Potential impacts as a result of the projects are as follows:-

7.4.1 Improvements in the Distribution System

Nakuru residents have long relied on borehole water which has high amounts of fluorine. With the proper design and construction of the new drinking water distribution system in the respective towns, leakage rates and risk of contamination during distribution will be decreased substantially, resulting in improved water quality for the residents.

7.4.2 Flood Control

Flooding risk - Major floods have been experienced in the low-lying parts of the Lake Victoria basin in the years 1937, 1947, 1951 and 1957-1958. In recent years, 3 major flood events in 1997-1998, 2002 and 2003 were experienced in the Lake Victoria Basin. The people affected are mostly in western and Nyanza provinces. However slum dwellers in towns like Nakuru who have erected informal structures near rivers are not spared.

Thus a dam is a significant positive impact since it regulates flows both for low flows and high ones.

7.4.3 Water Quality

There will be deterioration in water quality in downstream reaches of the stream. During construction, waste in form of rubble and other forms may cause pollution to water quality that can affect downstream users.

The reservoir's water quality in the long run will be threatened by land use activities like farming, water extraction, and any industrial activities in the upstream area.
New developments will provide substantial additional sources of polluted runoff or otherwise substantially degrade water quality in the dam area.

Construction water use may introduce excess pressure on scarce water resources especially in the drier season.

Potential sources of water pollution include site runoff and drainage from construction activities in the camps, effluent from general construction activities and sewage effluent from the construction workforce.

7.4.4 Disruption of Riverine Fisheries

The dam could lead to disruption of riverine fisheries downstream due to changes in water flow, blockage of fish migration and changes in water quality and limnological conditions.

7.4.5 Pollutants from Hydro-Turbines

Discharges containing grease or oil from the hydro- turbines may render the potable water useless; interfere with aquatic ecosystems, and present extra problems of removal in water treatment processes.

Phenols introduced into water in the parts-per-billion range can produce such marked taste that the water becomes unusable for many purposes including drinking.

7.4.6 Increased Run-Off

The new developments will substantially alter the existing drainage pattern of the site or area. The paving of the parking and roads in the water treatment plant will increase the rate or amount of surface runoff in a manner which would result in flooding on- and offsite given that the area has not been developed to handle more than the natural runoff. This could result in soil erosion.

7.4.7 Cross- Basin Water Transfer

There will be transfer of water from Lake Victoria Catchment to Lake Nakuru Basin.

7.4.8 Wastewater Flows

Wastewater flow will increase after the increase of potable water supply to Nakuru. New wastewater treatment plants will be required or the existing be expanded to provide for full wastewater treatment capacity including wastewater to be generated from the project. Currently, only part of the municipal wastewater is treated.

7.4.9 Sedimentation in the Reservoir

Indeed the major long term effect on water supply is a positive one in that the development project benefits the population, reduces levels of leakage, improves efficiency of supply, increases coverage, enables and sustains development and thus improves the economy to the benefit of the people of Nakuru.

7.5 Potential Waste Generation Impacts

Waste generation under the baseline conditions emanates from:-

- ✓ Typical domestic waste - generated from adjacent residences and farms
- ✓ Vegetation- dead and dried up vegetation
- ✓ Industrial wastes especially oils and grease in Juakali yards and
- ✓ Fly- tipping especially in urban areas (dumping waste illegally instead of in an authorized rubbish dump)

Waste management refers to:

- ✓ Solid waste management
- ✓ Hazardous wastes and
- ✓ Liquid wastes

a) The dam area

Since the communities are rural and lack basic amenities with no good water supply, there is a general absence of standard toilets (with flush system). The people use pit latrines and/or bush to discharge their excreta. They bury their dead ones on their parcels of land.

b) Along the pipeline route

The pipeline traverses a clean countryside area. Typical wastes include household litter and plastic packaging usually thrown by the roadside by travellers. Most of the waste is bio-degradable.

c) In Nakuru Municipality

The most common type of waste is plastics. Being a town, people do lots of purchasing and the wrappers even if reusable end up strewn all over. The municipal authorities have a garbage collection department complemented by licensed private collectors but these efforts are yet to achieve efficiency.

Waste generation for the construction and operation phases of the Project may arise from:

7.5.1 Vegetation Clearing and Transportation,

There will be some cutting down trees especially in the zone of inundation and pipeline through the forest.

7.5.2 Typical Construction Wastes

Huge effort is required to remove all the garbage, including packaging, surplus construction materials such as timber, concrete, gravel, metals and plastics, broken equipment, dilapidated buildings and miscellaneous debris that heap near the workers'

camps. If all these are left behind without being cleaned up, the environment would be damaged.

7.5.3 Surplus Spoil from Earthworks and Drainage Construction,

Whereas most spoil from excavations may be of reusable quality, disposal of the rest will pose a major problem

7.5.4 Electrical and Pipeline Cabling Off-Cuts,

This will be encountered when doing finishes. For such a large project the quantities will be large and hazardous.

7.5.5 Water Treatment Chemicals

These chemicals are a hazard especially because of the bulk quantities involved.

7.5.6 Typical Domestic Waste

New problems arise as it's difficult to remove refuse that inevitably collects wherever modern man sets up shop, even temporary shop. It will be generated from occupation of workers' camps, staff houses and offices.

Litter and fly-tipping is a serious problem that besides looking bad, also affects safety on the dam and therefore ought to be prevented. Litter can attract rats which can chew on cables, leading to signal failures, delays and even accidents. It can clog water intake points leading to spillages and losses.

The Contractor(s) will probably remove their own equipment, but it's unlikely for them to take responsibility for the informal settlements that will emerge along the pipeline, selling meals and other services to construction workers and also truck drivers.

7.5.7 Wastewater

The operations phase may generate sanitary wastewater primarily from staff and visitors. The increased water supply in Nakuru will increase domestic and industrial wastewater.

7.6 Potential Impacts on the Terrestrial Ecology

Terrestrial ecological values include:

- ✓ Bird species
- ✓ Plant species,
- ✓ Amphibians
- ✓ Reptiles
- ✓ Mammals

Dams can disrupt local ecosystems in irreparable ways. Some of the potential impacts on the terrestrial ecology are described as follows:-

7.6.1 Deforestation

The majority of the land that will be inundated constitutes natural or semi natural forest vegetation. Ndoinet forest inventories and preliminary field surveys suggest that the quality of forest that will be inundated is not of high quality. Based on field surveys, it can also be concluded that the existing forest that will be lost is almost all secondary forest and scrub of very low value. However the pipeline through the forest will affect high quality forest hence a significant adverse impact. The impact is mitigable.

However detailed surveys are necessary and forest conditions are better than in neighboring provinces. Given the scale of loss, we conclude that this constitutes a significant adverse impact. However, it should be possible to mitigate this impact by harvesting commercially valuable timber prior to flooding. Taking into account such mitigation, the impact may then be classified as a minor adverse impact.

7.6.2 Removal or Relocation of Trees and Vegetation

Potential environmental impacts associated with clearing include: removal of trees, shrubs and wildlife habitat, changes to soil water, temperature and fertility in adjacent areas, erosion and fire hazards due to slash stockpiling.

Construction will result in removal or relocation of trees and vegetation along the raw water pipeline and treated water pipelines, and within the water treatment plant site. These impacts are temporary. The topsoil will be preserved and original vegetation will be recovered or replanted after construction. No significant adverse impacts will be imposed on the local terrestrial environment.

7.6.3 Habitat Fragmentation

The construction and maintenance of pipeline wayleave may result in alteration and disruption to habitats.

Habitat alteration may include fragmentation of forested habitat; loss of nesting sites and other wildlife habitat through bush clearing; disruption of watercourses; creation of barriers to wildlife movement; and visual and auditory disturbance due to the presence of machinery, construction workers, and associated equipment.

7.6.4 Introduction/Loss Of Species

Generally, animals are less affected by construction activities than plants.
Establishment of non-native invasive plant species e.g. *Prosopis Juliflora* (*Mathenge*) or water hyacinth

Introduction of invasive animal species in the ecosystems e.g. the black eagle, the Nile Perch, clearing activities will affect animals such as rabbits, *dik dik* and birds.

7.6.5 Climatic Changes

The reservoir is likely to have local climatic effects in its neighbourhood.

7.6.6 Soil Erosion

Activities such as bush clearing, removal of top soil, excavation and mass haulage will expose the land to elements of erosion such as wind and water and thus will trigger the process of land degradation.

7.6.7 Hazards to Life

Introduced fire hazards – the wayleave within the forest is vulnerable to forest fires during construction especially from fuel spills.

7.7 Potential Impacts on the Aquatic Ecology

7.7.1 Habitat Alteration and Fragmentation

- Disruption of riverine fisheries downstream due to changes in water flow, blockage of fish migration and changes in water quality and limnological conditions.

7.7.2 New Species

Opportunistic growth of aquatic macrophytes in the littoral and sub-littoral zone of the reservoir

Increase in abundance and diversity of introduced species

7.7.3 Eutrophication

Current Land-use patterns and future changes and development activities in the watershed can accelerate the discharge of sediment and nutrients to lakes and impoundments, speeding up the eutrophication process and creating nuisance conditions because of excessive aquatic weed and algae growth.

The reservoir is planned to sit on a farming dependent region. Even the catchment area is heavily agricultural and with the farmers using fertilizers.

Eutrophication of reservoir water also reduces the oxygen content of the water downstream.

7.7.4 Disease-Insect Vectors

Creation of favorable habitats for the growth and proliferation of disease vectors

7.7.5 Water Quality

Alterations in the flow of water and changes in water quality during the construction of the dam is expected.

7.8 Potential Impacts on Land Management

7.8.1 Land Use in Economic Production

The creation of the dam will inevitably change this landscape, removing the river and most of the cultivated land and substituting a long, narrow, three-pronged lake behind a tall dam. Fluctuations in water levels would, at low water, expose bank sides with limited vegetation cover. Road works, the power station, pylons, and power lines may also intrude into this undeveloped landscape. This could be considered a significant adverse impact.

The ongoing study concluded that 250ha of agricultural land would be lost. The chosen site still minimizes the loss of agricultural land. Although the land lost constitutes a relatively small part of the total area, it nevertheless provides livelihoods for about 3000 local inhabitants. Given the scale of the loss and the value of the resource, this adverse impact is considered significant.

This loss can be directly mitigated given the availability of cultivable land in the area surrounding the reservoir. The present inhabitants can be resettled in the same area and provided with land of comparable size and quality.

In terms of overall agricultural productivity, it is anticipated that there will be some gains in terms of increased cropping on the downstream of the dam assisted by the augmented flows in the dry season. This will affect subsistence farming only as the people are used to rain-fed agriculture.

Land along the pipeline route is mostly a highway road reserve and as such farming will not be adversely affected except for dust on sensitive crops. However, the wayleave has utility lines already installed such as power lines, fibre optic cables and telecommunication infrastructure, oil pipelines and existing water and sewer lines. This will be affected during trenching leading to disruption in services. The assets owners will further want the proponent to meet costs for restoration of services.

Land affected in Nakuru is road reserve. However there are people trading using makeshift structures on this road reserve who will be affected temporarily. They will as

a result lose incomes but for a short while lasting the construction time. There are other sections where the available road reserve will be insufficient thus require acquisition of land for the pipeline. Land in Nakuru is highly partitioned and the acquisition will have to consider if whatever is left after acquisition of wayleave economic has value to the owner.

Land value in parts of Nakuru will appreciate greatly due to implementation of this project. This is because land that is not serviced with utility such as clean water and sewer lines means the purchaser has to meet the costs of these services if he opts to develop it.

7.8.2 Scenic Views and Vistas

The creation of a lake behind the dam will create scenic views that areas of such terrain hardly ever command. This will add to the aesthetics of the area.

7.8.3 Parks and Reserves

The dam can also be used for multiple purposes including recreation since there is a forest nearby. Activities like water sports can be introduced to the benefit of the community.

7.8.4 Loss of Control / Income on Land

A significant impact is the land-take with the potential to disorganize tracts land some containing dense human settlements all along the pipeline route and in the dam area. The project may require land-take of land under private tenure, public or community tenure, trust land or land under the jurisdiction of local authorities.

This can trigger demand for compensation all along the project route. Also, this will trigger associated social impacts

7.8.5 Earthwork Impacts

Loss of vegetation in land clearing for the camps, roads, borrow areas and associated facilities will alter the topography and introduce not-so-pleasant views.

7.8.6 Gender Disparity in the Adverse Effects of Land-Take

There will be need to watch out for marginalized groups in society who are in custody of family sources of livelihood such as widows and orphans.

7.8.7 Seismicity and Volcanic Activity Impacts

The Rift Valley still has some underground volcanic activity; as there are numerous hot springs, steam jets and geysers bubbling up from numerous locations. The Rift Valley is a tectonic structure that makes up the main geological feature of Central Eastern Africa. The Rift Valley system has faults with a variety of orientations.

7.9 Potential Impacts on Services Delivery

The project execution will likely cause disruption of services such as, electricity and water supply in various areas.

7.9.1 Improved Water Supply:

Water supply problems in Nakuru Municipality, Molo, Njoro and Elburgon solved. Industrial productivity will be enhanced. Since it is a large water supply scheme, it will reduce further construction activities that come with developing many small sources. Pollution from construction activities is localized at one source than when developing many sites/ sources.

7.9.2 Improved Sanitation

There will be better sanitation of the towns, good hygiene and improved standards of living for residents

7.9.3 Disruption Of Services

Utilities like power, internet, water supply, telecoms may be interrupted but this will last only during construction.

7.9.4 Pressure On Land And Services

Environmental degradation from increased pressure on land as people move and build in the serviced areas.

7.10 Potential Cultural Heritage Impacts

Kenya's most important natural heritage is her people – they are skilled, educated, experienced, productive and diverse. Their diversity, traditions, customs and practices create a totality of the distinct people that are Kenyans. They are multi- cultural, multi – national and multi – ethnic with many languages, religions and lifestyles. They work together compete and interact in many ways. Kenya is the only country in Africa with the three major linguistic groups – Bantu, Nilotes and Cushites.

The dominant indigenous communities within the project routes are:-

- ✓ Kalenjin- ogiek, ndorobo, kipsigis
- ✓ Kikuyu
- ✓ Kisii

All of these communities live in a rural setting and have a cultural way of life established over many years.

In urban centers encountered along the Project route, there is a higher degree of cultural mix.

7.10.1 Cultural Conflicts

A project of the magnitude of the proposed project is likely to attract large numbers of people to the project area. These people could be workers directly employed in the project or they could be providing services to the workers, the contractors or selling food to the workers. These people are of course from different cultural backgrounds. Due to the presence of migrant workers from different cultural backgrounds, conflicts with the local cultures could arise. The lifestyles of the migrants may not be compatible with those of the hosts and these could cause frictions. These are conflicts resulting from insensitivities of dam construction personnel to the local culture, traditions and lifestyles.

7.10.2 Social Problems

Due to the influx of migrant workers and the resulting changes in sexual behaviors, there is a chance of escalation of STI's including the deadly HIV/AIDS. There could also be cases of unwanted pregnancies as the migrant workers interact and get into relationships with the local communities.

7.10.3 Cultural Assets

There are no cultural heritage sites in the area, and the only long term environmental effect on utilities will be that of disposal of construction wastes and operational wastes of the treatment process to the a landfill site in Ndoinet area.

7.11 Potential Impacts on the Environment, Health and Safety

Dam safety cannot be overemphasized; the area surrounding the dam site is going to undergo changes once the project is introduced. Construction of the dam will bring with it benefits and risks. It places the population living nearby especially downstream at great risk.

Water treatment plant security is a requirement for operation of a water facility. Water utilities are viewed as part of the critical infrastructure of any society. As such, they have to be protected to ensure a supply of safe drinking water, as well as sufficient water for fire protection and industry.

Water transmission pipelines are normally buried underground to shield them from adverse environmental effects. This cover helps deter vandals and water thieves who prick to burst the pipes for water. But over time the soil cover on a pipe may be eroded and hence expose the pipe. Pipes age with time having served their useful life thus require replacement. The water transmission pipelines will need permanent markers to indicate the alignment for easy maintenance, to secure wayleave from encroachment and for public safety. Pipe bursts can cause severe damage to nearby property especially when the water flowing is at high pressures.

The process of quarrying rock, extracting other building materials, and constructing the dam, roads, and the power station will generate dust. This should be minimized by good construction management thus making the adverse impact minor.

7.11.1 Reduced Risk of Flooding

The dam will control flooding in the Sondu-Miriu River.

7.11.2 Risk of Drowning

Risk of accidental drowning

Injuries during dam construction and/or due to vehicular traffic

7.11.3 Risks of Diseases

These diseases range from vector-borne diseases and STI. Changes in sexual behaviour leading to the spread and/or escalation of sexually transmitted diseases (including HIV/AIDS) and unwanted pregnancies.

7.11.4 Risk of Dam Failure

There have been many dam failures world over. Even in this project there is risk of dam failure which would be catastrophic..

7.11.5 Fire Hazard

Potential adverse impacts related to fire hazards remain a main feature of this project. The plant will deal with combustible products (diesel), with possibility of an oil storage facility at the site and the risks associated with fire hazards form a significant adverse impact on the human health and environment.

7.11.6 Seismicity and Volcanic Activity Impacts

The Rift Valley still has some underground volcanic activity; as there are numerous hot springs, steam jets and geysers bubbling up from numerous locations. The Rift Valley is a tectonic structure that makes up the main geological feature of Central Eastern

Africa. The Rift Valley system has faults with a variety of orientations. It is documented that reservoirs have been linked to induced seismicity.

IMPACTS DUE TO INDIVIDUAL PROJECT COMPONENTS

8 THE DAM AND RESERVOIR SITE, IMPACTS AND MITIGATION

8.1 Description of the Dam

Dams have been constructed in order to prevent floods, to supply drinking and domestic water, to generate energy and for irrigation purposes since the old-times.

Dams have a great deal of positive and negative effects on the environment besides their benefits like controlling stream regimes, consequently preventing floods, obtaining domestic and irrigation water from the stored water and generating energy.

Dams hold possibilities of considerable harm for living beings in addition to their advantages such as meeting basic requirements of the society and increasing living standards.

The dam is located in the fringes of the Bureti forest zone. It is a rich agricultural land.

8.1.1 The Rockfill Embankment

The choice of dam in this study is a 57 m high rockfill dam with an asphalt bitumen concrete core. The embankment will be zoned type with the core placed centrally and vertical in the dam wall. Upstream of the core will be granular material to give the required stability of the dam. Downstream, the dam will have a chimney drain constructed in graded aggregate. The chimney drain will drain into a downstream blanket which will also be in graded aggregate

The asphalt core provided has minimum width of 50cm at elevation 2417m amsl whereas the nominal embankment crest elevation is 2420m amsl. The core is vertical. The core rests on a slab of asphaltic concrete 0.4m thick and width varying from 4.5 to6.0 m, placed on top of the concrete sill. The interface between the asphaltic slab and the concrete sill is cleaned by sand blasting, primed and coated with asphaltic mastic with a special additive to enhance interface bonding.

The outside slopes of the rockfill shells are sloped both in the downstream and upstream faces. The Upstream has a berm at 2379 m amsl that is the crest of the 15m high cofferdam that is eventually incorporated into the main embankment.

The proposed Dam and reservoir are shown in Figure 8-1.

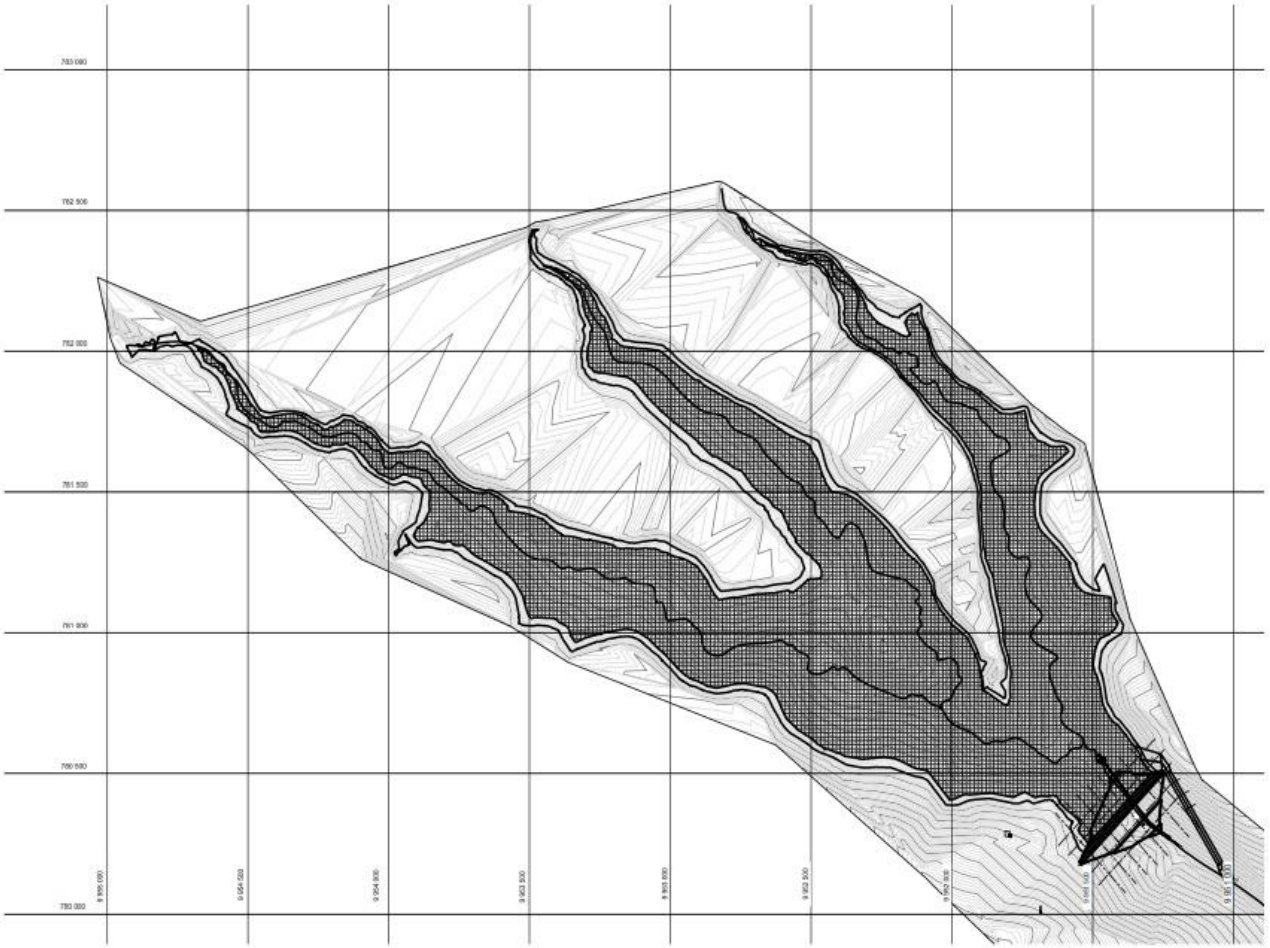


Figure 8-1: Reservoir Plan-Rockfill Dam Reservoir Plan

8.1.2 The Asphalt Core

An undocumented rule-of-thumb has evolved which calls for a core thickness at any level of at least 1 % of the head difference between the upstream and downstream sides of the core at that level. Norwegian experience suggests a minimum core thickness of 0.5 m, and no more than 1.0m should be necessary, unless there are very special circumstances e.g. in extreme earthquake regions or for embankments on compressible, erratic foundations.

8.1.3 AC Mix Design

The essential function of the core is to remain impervious without any significant increase in permeability due to shear dilatancy or cracking. Furthermore, should cracks occur, the asphaltic concrete mix design should be such that viscous creep and plasticity will gradually close these cracks (self-healing ability). A fairly soft and rich asphaltic concrete mix is specified to achieve the desired engineering properties and core behaviour.

8.1.4 Embankment Freeboard

The freeboard for a dam is the vertical distance between a specified reservoir water surface level and the crest of the dam.

8.1.5 Grouting

Grouting consists of drilling a line or lines of holes from the cut-off level of the dam into the dam foundation and forcing cement slurry, or chemicals under pressure into the rock defects, that is joints, fractures, bedding partings and faults.

For Itare dam, a grout curtain will be carried out under the dam core axis. The vertical depth of the curtain in rock will be 60m. The total length of drilling is 45,000m. Grout pressures will be limited to prevent hydraulic fracture of the rock.

8.1.6 Instrumentation

The factors of greatest importance to the safety of embankment dams and their spillways and outlet works are quantity and source of seepage, differential and total earth movements, water levels, pore pressures, and water quality. Appropriate instrumentation enables the dam properties to be monitored during construction and operation. These will help to give advance indication of the potential effects of any initial deficiencies or any deterioration during operations.

Suitable instrumentation is designed including piezometers, strong motion accelerometers among others.

8.1.7 Spillway

Geotechnical and hydraulic design considerations require that to minimize the risk of damage to the dam under flood conditions the spillway and discharge channel are kept clear of the embankment. The spillway is located on the left bank. It is a side channel type that consists of a lateral free weir 60m wide followed by a section leading to a straight chute. It is 485m total length. It has a 20m long flip bucket and a 50m long by 30m wide stilling basin that is also 10m deep.

8.1.8 Compensation Flow

According to WRMA rules of 2007, the reserve quantity for the river and stream shall not be less than the flow value that is exceeded 95% of the time as measured by a naturalized flow duration curve at any point along the water course.

A DN 1200 pipe with a valve is provided after due computations to discharge a downstream release of 0.402m^3/s. The valve is placed in the diversion tunnel which remains dry during operation. It is also used to release sediment during flood periods.

This is proven not to impair the Itare River flow which contributes as a tributary to the Sondu Miriu River and other WRMA established and licensed water abstractions further downstream.

8.1.9 Intake Tower

The intake tower will be a 63 m high free standing circular tower in concrete. A free standing structure will allow flexibility in locating on site, is easier to construct and allows better arrangement of conduits, openings, access structures and instruments as opposed to an inclined tower. The circular shape is to take advantage of its superior hydraulic characteristics. The internal diameter is 10 m with a wall thickness of 1 m at the bottom.

8.2 Potential Impacts on Environmental Values due to the Dam and Reservoir

8.2.1 Land Take

Possible relocation of human populations and associated impacts of economic disturbance, human trauma, and social disruption

8.2.2 Habitat Fragmentation

Fragmentation of river ecosystems due to creation of barrier

8.2.3 Staff-Wildlife Conflicts

Elephants are fond of trespassing into farms near the forest. They will continue doing so given that the staff quarters are near the forest cut-line.

8.2.4 Breeding Grounds For Disease Vectors

The reservoir may become breeding grounds for disease vectors- especially mosquitoes (which are vectors for malaria) and snails (which are vectors for Schistosomiasis) can take advantage of this slow flowing water.

8.2.5 Toxification

The initial filling of the reservoir will inundate the existing plant material, leading to decomposition of the plants and trees. The rotting organic matter settles to the non-oxygenated bottom of the reservoir, releases carbon into the atmosphere and eventually produces and releases dissolved methane.

8.2.6 Loss of Rich Sediment

Loss of flood recession cropping practiced downstream of dam - the land is cultivated taking advantage of the residual soil moisture as flooding recedes. The reservoir may affect the agriculture seriously.

8.2.7 Soil Erosion

- ✓ Reservoir induced downstream erosion

8.3 Control Strategies for Dam and Reservoir Impacts

8.3.1 Dam Safety

- ✓ Anchorage of embankment wall properly to the existing side embankments

8.3.2 Soil Conservation

- ✓ Installation of gabion protection at the abutments and up- and downstream of the channel to combat erosion
- ✓ Construction of silt traps upstream of the dam

8.3.3 Water Management

- ✓ Dam intake structure to allow staged abstraction of water from the dam

8.3.4 Staff-Wildlife Conflicts

- ✓ Installation of elephant electric fence and gate around the dam and water treatment plant site

9 THE WATER TREATMENT PLANT

9.1 Description

A principal issue in modern water treatment plant design is the decision of what chemicals are to be used for treatment processes, how they are to be shipped and stored, and what type of chemical feed equipment should be used.
Another pertinent issue is security of the plant. How to ensure that water is not used as a weapon of war.

The area surrounding the dam is generally peaceful and environmentally clean. It is a rich agricultural zone served by limited motorized transport hence little or no air pollution. The residents are a cohesive community with few security threats. Indeed only petty mischief like stealing of grains or cattle occurs and in rare instances. There is a KFS rangers outpost nearby with armed officers to safeguard forest resources from illegal logging and who provide reinforcement to the provincial administration.

The proposed location for the new Itare Water Treatment Works is approximately 38 km South West of Molo Town, at Survey of Kenya Co-ordinates N 9950000, E 779600, Arc 1960 Datum. The site is approximately 1.3 km off the proposed Itare Dam location, on the downstream side of the dam. A 1.3 km raw water mains conveys untreated water from the dam reservoir to the water treatment works. The raw water to be treated at Itare Treatment Works is of good Physical, Chemical and Bacteriological Quality and suitable as a source of drinking water after full treatment.

The proposed water treatment plant is a conventional type designed to treat 105,000 m^3/day of water including a 5% for backwashing and site. The treatment plant is designed to operate 24 hours a day.

As the Site is distant from nearest urban town i.e. Molo town, most of the key Treatment Works Staff will be housed on site. It will be required to have the staff reside on site and it is proposed to provide the staff housing.

The layout of the Treatment Works is planned in such a way that the operators can move easily amongst the various components on paved footpaths.

A layout plan of the water treatment plant is shown on Figure 9-1.

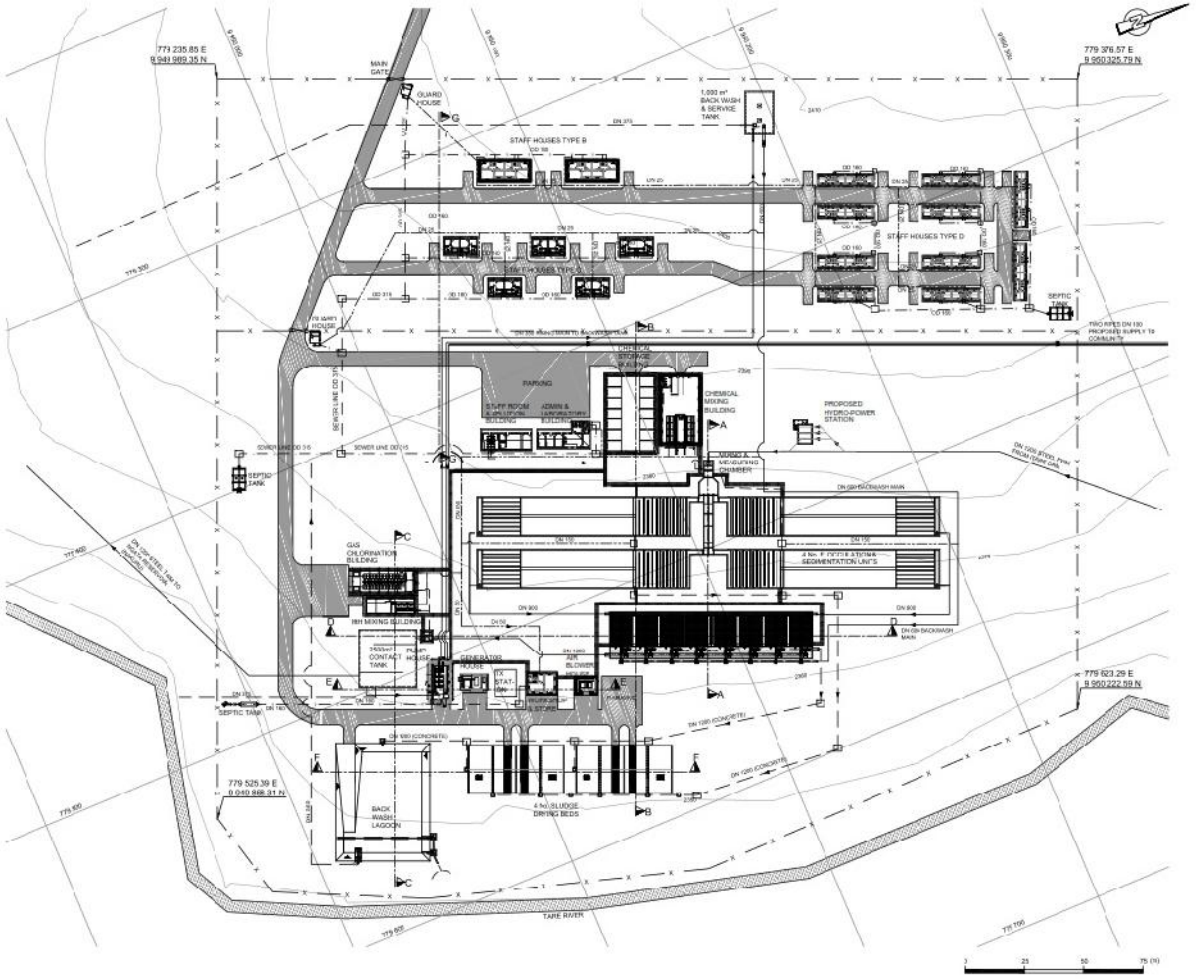


Figure 9-1: General layout of the proposed Water Treatment Works

9.2 Potential Impacts on Environmental Values due to the Water Treatment Plant

The environmental impacts of constructing water treatment plants are typically of greater potential magnitude than the environmental impacts of operations. Construction impacts are characterized by higher amounts of trucks, noise, and dust than there will be later, when the plant is operating. However, construction impacts are of shorter duration.

Operational impacts normally involve long-term issues related to design, daily operational performance, and maintenance of the facility--attributes that generally do not have the potential to significantly impact surrounding areas if a plant is well designed, well-constructed, and properly maintained and operated.

9.2.1 Clean Drinking Water

The treatment process will result clean drinking water that meets requirements of the WQR 2006. Other collective interventions will assist improve public health through a reduction in waterborne disease.

To the water utility companies there will be increased water supplies due to rehabilitation of the distribution lines and reduced losses through leakage.

The security of supply to un-serviced areas that currently depend upon bursts and leaks will be enhanced installed off-takes. Similarly to the small townships along the pipeline alignment with no access to piped water.

This will lead to improved performance, efficiency of service and higher revenue earnings for the water companies

9.2.2 Land Use Changes

The site and adjacent areas as currently set are pastures and farmlands. They are very quiet surroundings with motorable access roads. Hence materials delivery will not need to pass through private farms. The construction will however turn a calm village into a noisy hub of activity.

Truck routes will be widened from current sizes hence affecting sizes of land available for farming to the owners.

Area of groundwater influence might be affected by the placement of heavy structures such as sedimentation tanks as well as area of surface water influence.

Internal roads within the plant compound will be created to provide access to the different buildings and infrastructures of the plant, especially for the delivery of the water treatment chemicals.

Site compatibility with designs will affect amount of construction waste and earth from cut and fill activities.

9.2.3 Chemical Releases

Some of the chemicals used in water treatment are commonly found in household products; for instance, sodium hypochlorite is bleach, and aqueous ammonium hydroxide is household ammonia. These chemicals, when properly handled and stored, are safe. However, because the chemicals are often concentrated and used in bulk at water treatment plants, delivery, handling, and storage are particularly critical and are sometimes the subject of public concern because of potential environmental and safety risks. Use of chlorine gas, for example, often generates public concern because of the inhalation dangers if there should be a leak.

9.2.4 Risk of Water Pollution

Risk of water pollution as a result of discharge of untreated wastewater and filter-washing waters

The river which ultimately receive the wash water will be subject to a higher sludge concentration. The turbidity of the river at the effluent discharge point (downstream the Itare Dam) may be higher than as of today.

9.2.5 Fuel Spills

There are several examples of oil use and storage at a water treatment plant. For example, to ensure that a water treatment plant can fully function during a power outage, a backup power system (e.g., emergency/backup generators) is required. Even maintenance of mechanical fixtures and fittings including vehicles will cause leaks of used oils, greases and fuels.

9.2.6 Solid Waste and Storm Waters

Solid wastes will be generated both during construction and operation phases of the project.

Storm water discharge and flow re-direction with its attendant impacts such as flooding privately owned land, inundation of farms with growing crops will occur.

9.2.7 Air Emissions

Water treatment processes can create air emissions and odors, which must be considered during plant design. Examples of emission sources at a treatment plant include ozonation, chlorination, emergency power generation, and solids handling.

9.2.8 Flora and Fauna

Installation of conventional package treatment plant with combined coagulation, flocculation, and sedimentation and filtration processes capacity to treat 105,000

m^3/day may impact the site's biodiversity. Wildlife species (soil-inhabiting and plant dependent) may be temporarily disturbed.

The general vegetation in the treatment plant area is grazing grassland, secondary forest with few mature trees and low cover of no specific local, regional or national significance.

9.2.9 Oils in Water from The Power Generating Sets

The probability of unacceptable taste and odor being detected by consumers will be significantly increased.

9.3 Control Strategies on Impacts due to the Water Treatment Plant

9.3.1 Construction Scheduling

There will be no lasting adverse impact on the background, noise, dust/emissions as result of the works and the operations of the new plant.

Proper scheduling will help avoid disturbance to neighbors during construction

9.3.2 Performance Standards-

The plant will be designed to operate in compliance with industry standards even for redundancy.

9.3.3 Design Features

Before construction, the project designer must analyze the potential environmental impacts associated with a proposed change in land use of the site and the general project compatibility with surrounding land uses. This is particularly important when construction is proposed on a previously undisturbed site or within a nonindustrial area

Recommended engineering controls include;

- ✓ Installation of sprinkler systems
- ✓ Construction of storage spaces with fire-resistant concrete
- ✓ Providing separate containment areas for each type/category of chemical.
- ✓ Providing enclosed areas with proper ventilation for unloading chemicals is another design control that should be incorporated in the facility.

9.3.4 Physical Barriers

The first line of defense for a facility is at the perimeter. Barriers define the utility's borders and create a buffer zone with neighboring property.

A proper security fence will be erected around the plant and a guard stationed at appropriate positions to prevent trespassing by vandals or general public.

Electronic security systems are advisable.

9.3.5 Equipment Location

A central storage/parking for all construction equipment and vehicle will be required from the subcontractor. This will be located in the most appropriate location in the project area, in such that it does not affect excavation work and traffic flows at the same time containing any spillage maintenance work. A designated area for storage/containment of used and unused oils and degreasers will be allocated, preferably with proper flooring and ring canal, to prevent soil and waterway contamination. Used oils will also be dispensed in a controlled manner.

9.3.6 Chemical Handling

The guiding principles suggest separating people from hazardous substances, which can be achieved in a number of ways. One obvious method is to site the facility away from high population densities and particularly from very sensitive persons, such as children and the elderly.

Design aspects to address- Sizing of storage and feed systems begins with an investigation of dosage requirements for each chemical used. Minimum feed rate capacities and the feed equipment's capability to accurately feed at low rates are as important as maximum capacities. Sizing the Inventory. Inventory size is based on factors that vary from plant to plant, even within the same system. These aspects will control wastage and hence reduce chances of the chemicals finding their way to the surroundings which can be hazardous to the community

Also measures will be required to ensure containment of Dry Chemical Dust as any unloading or transfer of dry chemicals creates dust.

An emergency response plan should be developed to, as required, address the areas likely to require evacuation or protection in the event of a chemical spill.

9.3.7 Residuals Treatment and Disposal

Sludge from the treatment process may be dried and disposed in sludge beds or released to the river. Generally, the effluent discharge flow rate from this development can be considered negligible compared to the Itare river flow rate. Therefore, they may be a visual impact in the direct proximity of the discharge point, as the water may look a bit more turbid. This effect is nonetheless expected to be mitigated as the river will disperse the sludge into the main stream.

9.3.8 Wastewater Treatment and Disposal

This will be provided for using septic tanks/ soak away pits and toilets/ latrines be provided for workers and resident staff.

9.3.9 Visual Impacts Rehabilitation

Mitigating measures against predicted long term visual environmental impacts include retention of mature trees where possible, and/or planting/re-positioning of natural vegetation as a screen, arrangement of site drainage such as to retain surface water on site to mitigate against erosion and re-use of local soils and shredded vegetation for surface dressing.

Furthermore it is notable that;

- ✓ Impact will be will be minimal because most of the plants within are common and resilient (grasses).
- ✓ Wildlife species normally seek shelter in nearby vegetation
- ✓ Vegetative clearing will be limited to the treatment plant. Existing access roads will be used as much as possible. Vegetation buffer will be maintained around the work site for disturbed wildlife.

Landscaping is often a mitigation measure, although it can have impacts of its own, depending on the amount required and its compatibility with the area aesthetics. Planting ornamental trees in a natural setting, for example, may have a negative aesthetic impact rather than a positive impact. However, in general, landscaping provides an opportunity to restore and even enhance the natural attributes of the site, as well as provide visual screening from neighbors.

9.3.10 Oils and Greases from Power Generating Sets

The WQR 2006 anticipates nil phenols and petro-carbons in drinking water in Kenya. It will thus be upon the proponent and his design team to ensure the treated water meets these specifications.

The oiled and greased moving parts of the hydro-turbine should be contained in a chamber such that oils and greases do not leak into the blades that are in contact with water. In this way, water passing through the turbines will have no oils and greases hence proceeds to the treatment works for conventional treatment.

Other methods for preventing oil releases or spills from occurring include both administrative and engineering controls. Administrative controls might include Standard Operating Procedures (SOPs) and policies intended to direct human behavior in such a way that oil spills can be avoided.

There is, however, need for strength and quality of the available toxicological information on the contaminant found in the oils and greases.

10 BULK WATER TRANSMISSION

10.1 Description

Raw and treated water pipeline alignments have been selected based on the location of the water treatment plant, topography of the service area, existing distribution system, construction cost, and impacts on existing utilities and facilities. The alignments were also selected to minimize environmental impacts.

10.1.1 Raw Water Pipeline

The raw water pipeline is designed to convey untreated water by gravity from the dam reservoir to the treatment works nearly 1.3 km downstream of the dam. It is proposed to abstract 105,000 m³/day (4,375 m³/h). Details are given in Table 10-1.

Table 10-1: Proposed Raw Water Mains

Raw Water Main	Description	Remarks
Design horizon	2040	
Alignment	From the Itare Dam, the pipeline will follow through dense bushy land along the Itare river valley to the treatment works. Total length: 1.8km	
Maximum flow	4900 m³/h	Operating for 24 hours Throttled to give 4,375 m³/h during dry season
Dynamic head	1.89 m	Gravity main
Maximum static head	3.5 bars	Recommended Pipe class: PN 10
Maximum Velocity	1.2 m/s	Less than 2.5m/s
Size	DN 1200	Steel pipe
Air Valves (AV)	DN 200	Positioned at accentuate high points on pipelines as per design criteria
Washouts (WO)	DN 300	Positioned at accentuate low points on pipelines as per design criteria
Section Valves	None	
Material	Steel	

10.1.2 Bulk Transfer Treated Water Pipeline

The bulk transfer treated water pipeline will transmit water by gravity from the clear water reservoir at the treatment works to the proposed Ngata bulk reservoir site in Nakuru. Part of the conduit will have to be laid within a tunnel through the Mau Escarpment at a saddlebetween Molo and Londiani towns. It is proposed to convey a minimum of 100,000 m³/day

(4,375 m³/h) from WTP to Molo/Elburgon offtake. The details of the treated water main are indicated in the Table 10-2.

Table 10-2: Details of Treated Water Mains

Treated Water Main	Description	Remarks
Design horizon	2040	
Alignment	The alignment traverses as follows: 37km = WTP to Chepair township 21.7km = Along road B1 road (from Chepair to Kaplowa) 4.5km = From A104 road to tunnel start 14.3km = Through tunnel 1.5km = Tunnel end to meet A104 road 28.2km = Along A104 road 3.5km = From A104 road to Ngata bulk reservoir Total Length: 111.7km	
Maximum flow	From WTP to Molo& Elburgon off-take = 4416.2 m³/h From Molo/ Elburgon off-take to Salgaa off-take = 4004.2 m³/h From Molo/ Elburgon off-take to Ngata bulk tank = 4324.8 m³/h	
Total Dynamic Head	56.73 m = From WTP to Molo & Elburgon off-take 45.05 m = From Molo & Elburgon off-take to salgaa off-take 108.68 m = From Salgaa off-take to Ngata Bulk reservoir Total Dynamic Head: 210.46 m	
Maximum Velocity	1.02 m/s = From WTP to Molo & Elburgon off-take 2.10 m/s = From Molo & Elburgon off-take to salgaa off-take 2.08 m/s = From Salgaa off-take to Ngata Bulk reservoir	Maximum velocity = 2.5 m/s
Size	DN 1200 = From WTP to Molo & Elburgon off-take DN 800 = From Molo & Elburgon off-take to Ngata bulk reservoir	
Air Valves (AV)	DN 200 for DN 1200 pipe size DN 150 for DN 800 pipe size	Positioned at accentuate high points on pipelines as per design criteria
Washouts (WO)	DN 400 for DN 1200 pipe size DN 300 for DN 800 pipe size	Positioned at accentuate low points on pipelines as per design criteria
Section Valves	DN 1200 & DN 800	Positioned every 2-3km for rural areas and about 0.5km for urban areas
Material	Steel	Epoxy coating and lining

Several off-takes will be provided along the bulk transfer treated water pipeline from the treatment plant to Ngata bulk reservoir, to supply Molo, Elburgon and Salgaa/Rongai towns. The location of the off-takes has been selected based on the best possible route leading to the respective town. Molo and Elburgon will have to share the same off-take which will be located after the tunnel end. In future, it is envisioned a sump would be constructed near the off-take where water would then be pumped to the high level tanks in Molo, from where water will then gravitate to supply Molo town as well as supply Elburgon town via an existing DN 350/300 which exists between Molo and Elburgon towns.

The Rongai/Salgaa off-take will be at Salgaa market. Due to high pressures, a pressure reducing valve would also be provided along the off-take branch before the bulk meter chamber. It is proposed to supply Njoro town from the proposed Ngata bulk reservoir. Njoro is at a higher elevation than Ngata, it's envisioned to provide a pumping facility to supply water to Njoro. The off-take to Njoro will be at Ngata bulk reservoir site.

Table 10-3 details the proposed sizes for the off-takes with respect to the proportionate water demand.

Table 10-3: Water Production Summary

Project Areas	Respective water Demand (m^3/day)	Total Demand (m^3/day)	Off-take size
Molo	3,350	6000	300mm
Elburgon	4,650		
Salgaa/Rongai	700	700	150mm
Njoro	4,600	4600	200mm

10.2 Potential Impacts due to the Water Transmission and Distribution Pipelines

In constructing the pipeline in the side drain, care must be taken to backfill the trenches with rock fill above the pipe to prevent scour where slopes are in excess of 5% but observed practice on similar construction work on the previously laid pipelines has shown this to be both feasible and acceptable.

Where buried pipelines are practiced, which is understood to be for the majority of its length, no long term negative impact is predicted.

Short term nuisance includes inconvenience to the public from construction traffic, road width restriction, dust emission and noise but can be mitigated against by restriction of working hours, employment of signage and flagmen, water sprays and the temporary diversion of mudflows.

The most relevant existing environmental and social, and health and safety impacts are related to the deteriorated or insufficient capacity of the existing systems, as summarized below:

- ✓ Economic – insufficient water supply to the affected towns.
- ✓ Socio-economic - Health and economic impacts associated with water sold by vendors in tankers, without quality control. Health, social and economic impacts related to poor water quality and inadequate access to drinking water services.
- ✓ Health and safety - Aggravated consequences of fires due to low coverage or insufficient pressure associated with existing fire protection system.

10.2.1 Direct Land-Take

The major pre-construction impact pertains to the apprehensions of local stakeholders about the inconvenience construction activities would cause the public (road users, residents and business establishments) when the pipelines are laid. Such a situation engenders a feeling of uncertainty about the future and could put plans and impending projects on hold. Local businessmen especially those with street level / roadside establishments may fear disruption/destruction of their business operations while basically perceptual, fears and apprehensions could be expressed in very concrete behavioral attitudes such as opposition and even possible hostility to the project. The source of this hostility likely stem from owners of structures who perceive that they might be displaced from the ROW spaces they occupy. These potentially hostile parties could include a broad spectrum of building owners, homeowners, urban poor residents, subdivision owners and developers, businessmen, and their political allies in local government and non-governmental organizations.

10.2.2 Disruption of Services

The secondary or indirect impacts of the trenching works will be disruptions to traffic, pedestrians, and safety issues where trenches are located along pedestrian pathways and where they may block access to private and/or public property in both residential and commercial areas.

- ✓ Interruption/disruption of water supply

10.2.3 Disease Vectors

There are also concerns that trenching if conducted during the rainy season or if left open for too long period can provide favorable conditions for breeding of mosquitoes (and thus spreading of disease)

10.2.4 Wastes

- ✓ Used oils or fuel, as well as oils from washings of machinery and heavy equipment may be accidentally spilled in the soils and may be carried by run-off to nearby rivers further increasing background oil/grease levels in the environment.
- ✓ Dumping grounds for rubbish.

10.2.5 Emissions

- ✓ Emissions from haul trucks, backhoes and bulldozers increase SO2 and nox levels. The increased traffic caused by the haul trucks may also generate TSP during their travels

10.2.6 Noise

- ✓ Noise generated by the activity of the equipment may disturb some wildlife and cause nuisance to the neighborhood.

10.2.7 Clearing Of Vegetation

- ✓ Clearing of vegetation or crops will be inevitable but is limited to the ROW only.

10.2.8 Pipe Bursts

- ✓ Frequently bursts and leaks currently experienced will cease
- ✓ Abandonment and solid wastes emanating from dis-used pipeline
- ✓ As the pipeline ages, bursts will occur more frequently.

10.2.9 Long-term Environmental Effects

There are no long-term environmental effects on cultural heritage sites in the area. Indeed the long term effect on water supply is a positive one in that the project benefits the population in major sections along the route in Molo, Elburgon and Nakuru, reduces levels of leakage, improves efficiency of supply, increases coverage, provides the opportunity for economic development and thus improves the economy to the benefit of the people of these areas.

10.3 Control Strategies for Water Transmission and Distribution Pipelines Impacts

Where during construction there is a danger of increased run-off or erosion of trenches, temporary bunds and/or drainage channels or holding ponds need to be employed.

10.3.1 Waste Management

All vehicles and equipment need to be regularly serviced to ensure that no fuel or oil leakage occurs and refueling points and fuel storage areas need to be bunded and/or impervious hard standing provided.

Where pipelines are constructed for the purpose of distribution in or along existing roads similar precautions apply.

- ✓ All vehicles and equipment are to be regularly serviced to ensure that no fuel or oil leakage occurs.

10.3.2 Visual Impact

The only lasting negative environmental visual impact is likely to be from exposed sections of pipelines on pillars and where the pipeline cannot be buried due to hard rock conditions.

- ✓ It is proposed to construct the pipelines below ground surface. The pipes that will be installed will be placed in trenches prepared by excavating into soil. Once the works are completed and all tests passed, the trenches will be closed.

The trenches will mostly be ranging from 1.5 – 2.0 m depth and approximately 1.5 m wide. The resulting 'footprint' of disturbed land will therefore only be of the order of 2-3 meters wide for small-bore pipelines, and up to 5- 6 meters wide at most, for large-bore pipes laid in trenches 2-3m deep and 1-1.5 m wide. This will accommodate the topsoil spoil on the outer side and the excavated trench material placed next to the open trench for immediate backfill.

10.3.3 Land Take

- ✓ Relocation impacts are minimized as the new pipeline will be on existing highway and pipeline reserves as much as possible. Extension pipeline however will be on newly acquired reserves.
- ✓ Where pipes will be placed under existing paved roads, the top layer will be reinstated by paving back the top of the trench with asphalt. All soils within the reserve are either already disturbed, natural soils or imported material for formation of embankments. Long lasting visual impacts, lasting impact on background, noise, dust/emissions or indeed impacts on the natural hydrology geology or ecology are not anticipated.

10.3.4 Services Delivery Impacts

- ✓ Short-term nuisance includes inconvenience to the public in the remote areas from construction traffic, road width restriction, dust emission and noise. This can be mitigated by restricting the working hours, employment of signage and water sprays. In cases where it is identified that during construction there is a danger of increased run-off or erosion of trenches, temporary drainage channels or holding ponds can be employed.

10.3.5 Vegetation

- ✓ During pipeline construction, measures need to be taken to minimize severely damaging the original vegetation. Large-scale removal of trees and vegetation due to project activities is not expected. Climate, air quality and physical features are not predicted to be impacted upon in a major way; there may be short-term impacts due to excavations, dust and noise. However, mitigation measures will be taken to restore the adverse impacts.

11 THE 14 KM BULK TRANSFER TUNNEL

11.1 Description

The installation of the gravity treated water mains requires sufficient head for water to flow by gravity. For this reason, installation of a tunnel in Mau escarpment is unavoidable in order to allow for gravity flow. Otherwise pumping would be required. The engineering solution to navigate through the saddle between Londiani and Molo towns via a tunnel is both economical and eco-friendly.

The tunnel is designed in two alternatives depending on the method of construction to be employed by the contractor, namely;

- ✓ Drill and blast
- ✓ Tunnel Boring Machine (TBM)

Tunnel excavation in solid rock may not need much roof support to hold the rock. On the other hand, weak or weathered rock may need heavy support mechanisms Tunnel support systems typically consist of steel arches, concrete segments or shot-crete and rock bolts. Design for this project has identified shot-crete with rock bolts as suitable for support.

The design gives the initial support recommendation that will be modified to suit ground conditions revealed by further pre-construction site investigations and contractor's input. The modification will result in final support design.

The tunnel runs below the Londiani forest for about 3 km after which it runs below farmlands. Both ground and surface water exist at the project area. Geophysical measurements involving Vertical Electrical Sounding (VES) were executed to reveal the geo-electrical resistance/resistivity layering at pre-selected points at every 250m interval for a 14km. Generally, the greater part of the investigated pipeline route show the subsurface geology at depth greater than 30m below as underlain by competent formation with exception of a few areas.

The primary purpose for the tunnel construction is to facilitate gravity flow of the water supply pipeline. The DN 1200 steel pipeline shall be installed in the tunnel but allow both motorable access for maintenance and also allow future similar pipeline to be laid within the tunnel. There are provisions for 3 no air-valvels, isolation online valves at either end of the tunnel and average of 2 no concrete supports per each 12m steel

pipe. The tunnel size of 4m diameter is optimal for the designed pipeline and the installation shall require special equipment from the traditional types utilized in open spaces. However, for the tunnel installation the constricted operation space shall require lifting devices/cranes, motorised pipe trolleys or tow vehicles with relatively low profiles.

It is recommended that after construction the Contractor shall leave a secure vent system with connection facilities at either end of the tunnel that would allow the Operator to connect their mobile air supply/ blower and extractors. Provision has also been made for securing both ends of the tunnel with lockable gates to prevent unwanted entry to the tunnel.

Tunneling is a challenging exercise. It has been extensively carried out in Europe and long-standing European tunneling traditions have evolved. These traditions are celebrated around the world to secure good luck, success and protection for everybody working on a project. Some of these all-time world-wide honored tunneling traditions include naming of the tunneling machine such as the TBM. Boring cannot start until local people have chosen a suitable name and, as is customary, it is given a woman's name as a sign of good luck for the project ahead.

Parties likely to be involved with this or that role during the tunneling include:-

- The Client (RVWSB)
- Design Consultants
- Coordinator for H&S
- Contractor
- Owners of the technology to be used e.g. TBM Manufacturers
- Workforce
- Professional Organization's
- Regulators and Standardization bodies
- Insurers

11.2 Potential Impacts

11.2.1 Tunneling Risks

The existing environmental quality may give risks (delay, extra costs) to realization and maintenance of a tunnel.

The nature of tunnel construction allows design on a contingency basis in which the support systems are modified to suit the conditions encountered. This approach requires monitoring in situ conditions as excavation proceeds because of the relative non-predictability of rock-mass response to an opening.

11.2.2 Tunneling Hazards

Not only will the tunnel impact its environment, but vice versa the natural environment will also impact on the tunnel. The various environmental effects play a role during the realization and use of the tunnel and must be considered during the design phases.

The physical impacts of tunnels on the environment may affect the:

- ✓ Living conditions for humans 'humans' (e.g. noise, safety of workers)
- ✓ Habitat of fauna around the tunnels ' natural environment' (e.g. disturbance)
- ✓ Cultural quality 'man made environment' (e.g. landscape and design)
- ✓ Use of resources 'natural environment' (e.g. depletion of energy and materials)
- ✓ There is likelihood of underground CO_2 deposits along tunnel route in which case proper channel of engagement should be opened following land management guidelines.

All the health and safety hazards of normal civil engineering construction can be found in tunneling along with a few which are specific to tunneling. In most cases the risks arising from these hazards present more severe consequences in tunneling. This increase in severity is due to a number of factors including:

- ✓ The degree of uncertainty in the nature and variability of the ground through which the tunnel is being driven.
- ✓ The confined space of the tunnel environment
- ✓ A poorly developed safety culture at all levels in the workforce
- ✓ A lack of commitment from all parties to the project in addressing occupational health and safety.
- ✓ Failure by the industry, to learn from the experiences and mistakes of others.
- ✓ Work in compressed air.

11.2.3 Noise & Vibrations

Noise is perceived as the most important environmental problem for people living close to tunnels. Both construction and operational noise could potentially impact sensitive receivers in adjacent lands.

Noise from construction activities may affect dwellings. These include, amongst others, the use of heavy cranes, or contiguous bored piling and hydro-cyclones to clean up spoil and re-cycle bentonite in the construction associated with the tunnel

Some operations may so require construction works to be carried out during the nighttime in order not to interfere with daytime services or in order to fast-track on completion time

Potential vibration arising from the tunnel boring operations over 24 hour working may disturb local residents.

In a quiet rural environment, the passage of trains in the tunnel has the potential to cause ground-borne noise and vibration in the operation phase

11.2.4 Air Quality and Dust Emissions

Air quality impacts would be most significant during earthworks and excavation activities.

Dust may be generated from excavation, cutting, filling, stockpiling and construction vehicle movements associated with the construction of the tunnels.

Potential air quality impacts may arise from the operation of construction plant and vehicles. Dust has the potential to impact vegetation as well as sensitive receivers along the tunneling sections of the alignment.

Tunneling activities such as rock excavation by tunnel boring machine (TBM); cutter boom or road header; muck handling; blast hole drilling; and rock bolting generate lots of inhalable dust.

The removal of spoil materials from tunneling may also lead to odor impacts.

11.2.5 Wastes Generation and Land Contamination

Construction waste products may be generated. It is envisaged that large quantities of spoil will need to be disposed of from tunneling operations and the excavations.

Contaminated soil from container storage or vehicle repair sites will require disposal at suitable sites. Some areas of potentially contaminated land (container storage/vehicle repair) may occur

Construction and demolition materials will either be reused on site, or disposed of at a public filling area in accordance with the approved Waste Management Plan and as agreed with the Engineer.

11.2.6 Restriction on Working Hours

Occasional entry under compressed air may be required, such as to clear obstructions ahead of a tunnel boring machine, or to perform essential maintenance on parts of such a machine. Compressed air working has become uneconomical because of

working hour restrictions, time for decompression that results from high working pressures (over 40 psi is not unusual), labor union agreements for work under compressed air, and high workmen's compensation and health benefit rates.

11.2.7 Other Hazards

Many hazards are common to soft ground and hard rock tunnels. All hazards should be identified at the onset. Likely Health and Safety hazards affect:-

- ✓ Personnel directly undertaking the construction work , or
- ✓ The general public - at risk of being injured by tunnel collapse

11.2.8 Hydrology

The tunnel boring operations may lead to potential loss of groundwater. Interference with available aquifers has the potential to impair local abstraction practices that rely on groundwater rather than surface sources.

Potential settlement along the tunnel alignment may also change surface hydrology

During the operation phase, a localized lowering of the water table may result if the tunnel(s) is not completely watertight. There may also be a possible permanent alteration in seasonal groundwater movements owing to the presence of the tunnel in the weathered rock phase, particularly with the potential to affect the rate of replenishment to wells in the surrounding environment.

11.2.9 Groundwater

Most tunnels through hills and mountains have water problems. Surface water penetrates through fissures and percolates through permeable soils. Attempts to seal off the rock by grouting, with either cement or chemicals, usually are not completely successful since very high pressures may build up even if flows are low.

11.3 Control Strategies on the 14 Km Tunnel

11.3.1 Dust Emissions and Air Quality

Tunnel ventilation and smoke extraction facilities should be carefully positioned to avoid potential air quality impacts.

Respiratory Protective Equipment (RPE) is normally needed to reduce dust exposures to acceptable levels in small tunnels while a machine operator's cabin with a clean air supply should be provided in bigger tunnels. The workers should ensure that their RPE are properly functioning all the time

Fit a manometer or pressure gauge to show that the clean air supply is working properly with markings on the acceptable range of readings

Arrange for ventilation to dilute and remove harmful substances. A controlled recirculation system with air filtering may be needed.

Use of equipment fitted with water suppression to minimize the amount of dust created is recommended. Dust is suppressed at source with a water spray delivered directly to the cutting heads.

Other dust suppression measures will be adopted. These include on-site vehicle speed restrictions and wheel washing facilities at all site access points, careful handling and the containment or damping of dusty materials, and frequent watering or covering of exposed areas of ground and prompt site restoration. These measures will be used as general practice to all construction sites to ensure that potential dust emissions are controlled and impacts upon sensitive receivers are minimized.

11.3.2 Land Contamination

Appropriate measures will be taken to remediate any contaminated land or to ensure disposal of contaminated materials to a suitable site.

The adoption of safe site practices should prevent the exposure of workers to potential risks associated with contaminated materials.

11.3.3 Noise & Vibration

General site practices including the location of noisy machinery away from sensitive receivers; the use of silencers, mufflers and acoustic shields on plant and equipment; regular maintenance of plant and equipment; and the reduction in number of machines used at any one time, will be adopted to control noise impacts.

With respect to the bored tunneling operations, the TBM launching shaft should be fully covered if found to be necessary. Some TBM has minimum vibration impact.

11.3.4 Visual Impacts

Solid site hoardings will be erected around construction sites before the commencement of works to reduce the potential visual impacts of the works.

Upon the completion of construction, reinstatement of visually amenable features and re-vegetation will be implemented.

Landscaping and planting where applicable will be implemented to minimize visual impacts.

11.3.5 Waste

Mitigation measures to control waste will include adoption of general good housekeeping practices, sorting and segregation of wastes for reuse and disposal, agreement with the Engineer on an allocation of space at a public filling area for the

tunnel spoil and other excavated materials, and the designation of specific access routes for disposal vehicles.

Observation of the requirements of the EMCA Waste Discharge Standards will prevent adverse impacts. Appropriate disposal routes will be determined for removal of all wastes.

11.3.6 Hydrology

The use of some TBM machine can be expressly selected to avoid any draw-down of groundwater, and/or the need for compressed air working or grouting which might lead to the impairment of an aquifer. It has been demonstrated that the technology generates minimal settlement at the surface.

Hydrological studies to be undertaken which will characterize the hydro-geological regime and groundwater flow sensitivity analysis used to test that the tunnel(s) placement and partial obstruction in the residual rock phase does not cause permanent adverse impact to groundwater movement.

If a totally water tight tunnel is maintained, this would avoid lowering of water table.

11.3.7 Groundwater

It is good practice to design tunnels assuming that they will leak and therefore provide appropriate drainage paths.

11.3.8 Design Considerations

In the absence of Kenyan Code of Practice for tunneling, adopt the BS 6164-2001 Safety in tunneling 2011. (BS 6164:2011, Code of practice for health and safety in tunneling in the construction industry)

- ✓ RVWSB should set overall strategy for health and safety for project
- ✓ Tunnel ventilation system design should ensure adequate ventilation
- ✓ Specifications for the tunneling method adopted should ensure safety
- ✓ He design should exert considerable influence over health and safety
- ✓ Tunnel design ought to be such that working space is adequate, contaminated land is avoided, openings and changes in section are designed to be safely
- ✓ The design should specify minimum standards for safety requirements, atmospheric monitoring, communications and ventilation
- ✓ Early contractor involvement and/or partnering should be encouraged

All designs shall be subject to a design check to ensure that a robust design has been achieved.

Design programmes shall allow for sufficient time for the appropriate level of checking.

11.3.9 Safety

- ✓ All parties shall comply with the OSHA on Health and Safety at Work and other relevant statutory provisions as appropriate. They shall also comply with the requirements and recommendations of relevant BS or other Codes of practice for safety in tunneling in the construction industry
- ✓ An acceptable safety program shall be put in place before tunnel construction works.
- ✓ Compliance with health and safety requirements is the responsibility of managers and individuals at each and every level.
- ✓ All safety and emergency procedure training shall be reinforced by regular practice drills.

A sample safety program is as follows:-

a) General Requirement

- Employees Identification at entrance to tunnel for the purposes of records of the number of workers in the tunnel
- Illumination inside the tunnel during construction works, emergency lighting sources should be put in place.
- Proper communication facilities should be provided
- Personal Protective Equipment should be provided to all Workers.

b) Emergency Provision

- Emergency evacuation plan should be developed, and emergency procedure instructed to workers.
- Emergency crews and equipment for rescue should be provided. This include firefighting equipment and vehicles, first aid shelters, rescue containers, ambulances and emergency oxygen supply equipment

c) Ventilation system

- Provide ducts, fans and auxiliary equipment for air flow induction and expulsion from the tunnel. Similar equipment for air release should be installed for exhaust air and other gases encountered in the tunnel.
- Provide equipment for airflow and air quality measurement.
- Provide dust control systems

d) Fire prevention measures

- The use of high flammable gases e.g. LPG and natural gas. should be avoided in the tunnel.

- Acetylene and methyl acetylene propadiene stabilized gas may be used for welding.
- Care should be taken not to permit more than required amounts of fuel gas and oxygen.
- Diesel piping should be avoided
- Fire resistance hydraulic fluids should be used
- Fire extinguishers should be provided along the belt conveyor

e) Progressive material exploration

- Ground conditions should be examined before any works are carried out.

f) Water and Aquifer detection

- Where there are occurrences of ground water, dewatering can be employed. Care should be taken to avoid settlements exceeding the set limits and will not cause damage to existing properties and structures.
- Consents or permits should be obtained from relevant body before de-watering.

11.3.10 Historical and Cultural Impacts

It is unknown if major items of cultural heritage value will be directly or indirectly affected by the proposed tunnel construction. If items of such value are encountered, it will be taken up with relevant authorizes e.g. the National Museums of Kenya. The operation phase may not affect any major items of cultural heritage value.

11.3.11 Routine Monitoring

Elements to be monitored during construction may include:

1. Closure of the opening and strain gradients in the rock mass
2. Support system strains and loads
3. Ground surface subsidence in built-up areas (surface subsidence may result from closure of the opening, from running ground into the opening, or from the lowering of groundwater causing compression in overlying soil formations)
4. Vibrations from blasting affecting surface structures or adjacent underground openings

The full scale testing will run concurrent with construction. The contractor will undertake the necessary ground investigation and laboratory testing as part of the contract.

12 BULK RESERVOIR STORAGE AND BULK DISTRIBUTION PIPELINES

12.1 Description

12.1.1 Ngata Bulk Storage Reservoir

A 5,000 m³ reinforced concrete ground reservoir will be constructed at Ngata bulk reservoir site. The reservoir will act as a command tank for water distribution to other reservoirs within Nakuru supply area. The proposed location of the reservoir at a high elevation of 2148 mamsl, will make it possible for water to flow by gravity to the existing and proposed reservoirs located within Nakuru supply areas. The outlet of the reservoir will be metered.

Ancillary facilities at the reservoir site will include an operator's office, two unit staff house (type C), a guard house, ablution block for workers and security men, wire fence with concrete support poles and a lockable double leaf gate. The layout of the Ngata bulk reservoir site is shown on Figure 12-1. Provision for future building and structures has been provided, this include the pump house for Njoro water supply. The site will also accommodate a 5,000 m³ Ngata distribution reservoir. There is 1 acre (0.4 hectare) of land available at this location. However, more land will be required to accommodate the two reservoirs.

12.1.2 Nakuru Storage Reservoirs

Nakuru town distribution system is categorized into 5 main water supply zones. These zones are supplied through six existing tanks namely; Mereroni Works Reservoirs, Crater Climb Reservoir, Playing Field Reservoir, Prison Road Reservoir, Nakuru Western Reservoir and Nakuru Eastern Reservoir.

With the additional water capacity of 85,500 m³/day from Itare dam and nearly 50,000 m³/day from the existing sources, the total production is expected to be 135,500 m³/day. Based on storage of 30% average daily demand, additional reservoir storage of about 40,650 m³ is required since the existing storage capacity is 23,850 m³.

This project proposes to construct four additional storage reservoirs within Nakuru supply area in a manner that ensures equitably distribution of the additional storage capacities in the zones.

New zones which were not covered were included in the existing zones. A new zone named Ngata zone was created to accommodate un-zoned areas which includes Ngata and the areas around Ngata that are within the project supply area. The

proposed zones are therefore as follows; Central zone, Northern zone, Southern zone, Eastern zone, Western zone and Ngata zone. The additional reservoirs are proposed to be situated close to the areas experiencing more water shortage

The following are the details for the proposed reservoirs.

Table 12-1: Details of the Proposed Additional Reservoirs for Nakuru

No.	Proposed Name	Proposed Location	Co-ordinate Location (Zone 37)	Elevation (m)
1	Ngata Distribution Tank	Ngata next to Ngata Bulk Tank	X: 175771 Y: 9971397	2148
2	KBC Tank	Menengai Crater Forest Reserve (near KBC Mast)	X: 175777 Y: 9971130	2060
3	Prison compound Tank	Nakuru Prison	X: 171969 Y: 9971403	2020
4	Kelelwet Tank	Kelelwet Secondary School	X: 169119 Y: 9962127	1956

The new reservoirs will be ground tanks of reinforced concrete. Their sites will also accommodate a guard house and an ablution block except for Ngata distribution reservoir. The reservoirs sites will be enclosed in a wire fence with concrete support poles and a lockable double leaf gate.

a) Ngata Distribution Reservoir

Ngata distribution reservoir will be constructed next to the 5,000 m3 Ngata bulk reservoir, at an elevation of 2148 m amsl. It will supply Ngata zone, south west parts of Northern zone i.e.parts of Olive and mercy Njeri and western parts of Western zones i.e. parts of Ingobor, Mogoon and Subuku. Based on the Google earth elevations the supply areas are at a relatively lower elevation.

b) KBC Reservoir

KBC reservoir will be constructed in Menengai Crater Forest Reserve near KBC mast (hence the name KBC reservoir) at an elevation of 2060 mamsl. It will serve Eastern and parts of Southern distribution zones.

c) Prison Compound Reservoir

Prison compound reservoir will be constructed inside the Nakuru prison compound at an elevation of 2020 mamsl. The reservoir will supply parts of Northern zone i.e. London, Milimani and Viwandani and Central zone.

d) Kelelwet Reservoir

Kelelwet reservoir is to be constructed at Kelelwet secondary school, at an elevation of 1956 mamsl. The reservoir will supply the western zone except Subuku and some parts of ingobor which will be supplied vie Ngata Distribution reservoir.

According to the 2012 Feasibility Study, land should be acquired for the construction of these reservoirs. The sizes of these lands will depend on the reservoir sizes. The identified reservoir sites are on public land hence land acquisition will not be a lengthy process.

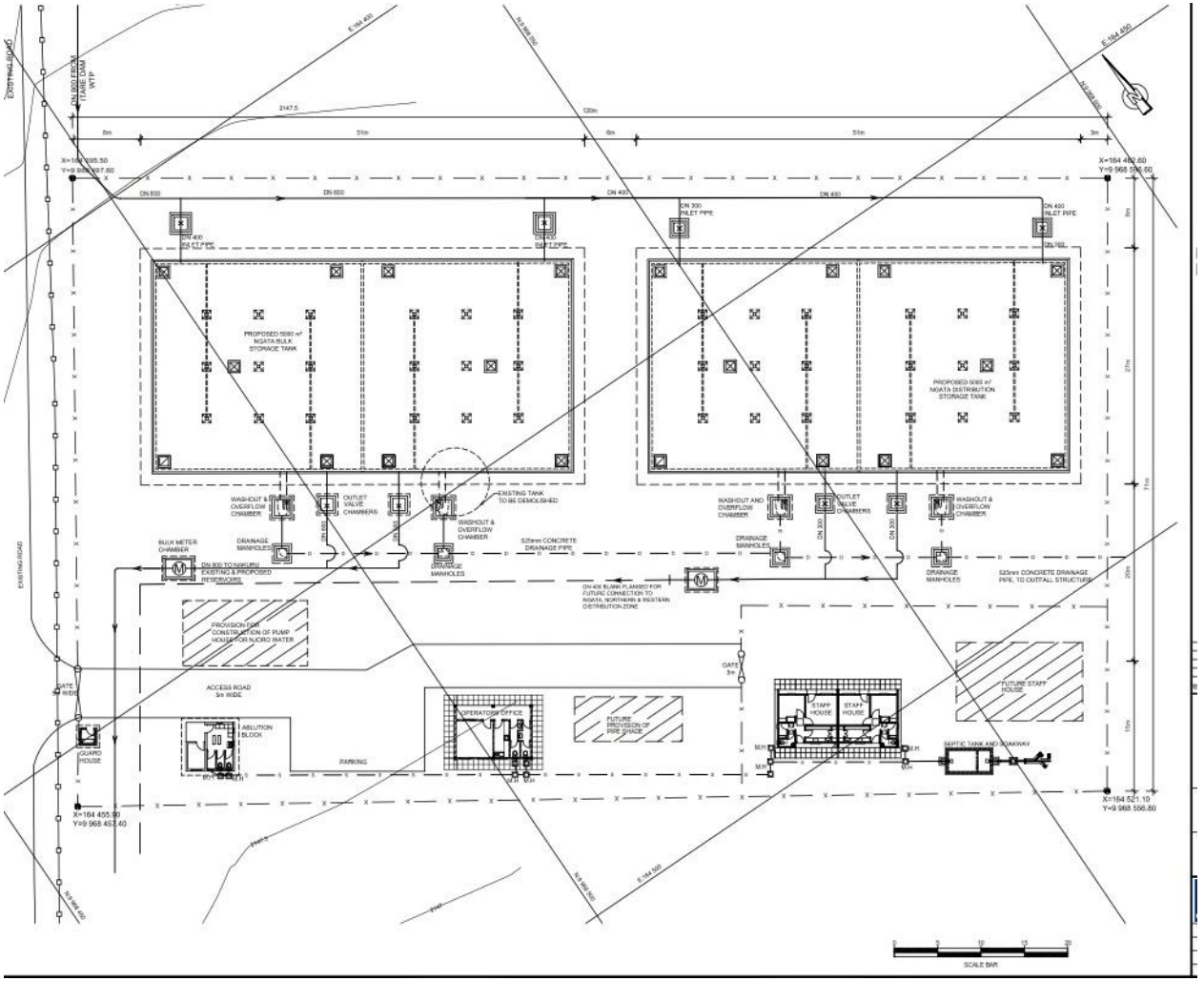


Figure 12-1: Proposed Ngata Bulk Reservoir Site layout

12.1.3 Bulk Distribution Pipelines

The independent bulk distribution pipelines from Ngata bulk storage reservoir will be laid to connect to all existing reservoirs as well as to the new additional reservoirs within Nakuru. The total length is anticipated to be nearly 32 km of pipeline. The pipelines will be steel of varied diameter ranging from DN 200 to DN 800.

Alignments of the pipelines will follow existing or planned roads as much as possible to minimise compensation costs and facilitate easy access to the lines and fittings. The minimum cover to the pipes shall be 0.9 m, but where the pipe is subjected to vehicular traffic the minimum cover shall be 1.2 m. To avoid cutting of the tarmac road and railway line, it is further recommended to conduct horizontal drilling at the locations where the pipe is crossing tarmac road or railway line.

Air valves (39 No.) wash outs (15 No.) and section valves (13 No.) will be installed in the trunk main system.

12.2 Potential Impacts due to the Bulk Water Storage Tanks

Potential Impacts on Environmental Values include

12.2.1 Increased Storage Capacity

Through the Construction of New Water Storage Tanks is a significant positive impact.

12.2.2 Noise Pollution

- ✓ From associated activities such as construction machinery, e.g. Scrubbing and beveling

12.2.3 Visual Impact

- ✓ That could be a negative if landscaping and aesthetics are not addressed.

12.2.4 Vegetation

- ✓ Impacts on flora and fauna from site clearing activities

12.2.5 Occupational Hazards

- ✓ Occupation hazards to workers such due to risk of accidents

12.3 Control Strategies on Impacts due to the Bulk Water Storage Tanks at Ngata

12.3.1 Visual Impact and Vegetation

- ✓ Plant vegetation to enhance appearance of the sites.
- ✓ Impacts on flora and fauna are negligible. Naturally growing vegetation will grow back to original situation

12.3.2 Occupational Safety

- ✓ Use of Personal Protective Equipment (PPE) during construction and operation phase.

13 THE ACCESS ROAD

13.1 Description

The access road is located in the periphery of the inundated area. It will provide alternative passage for the residents between the ridges which have been previously using the road in the area to be inundated. It will also entail upgrading the 12km road from Sitoito centre to murram standards.

13.2 Potential Impacts on Environmental Values as a result of the Access Road

13.2.1 Better Roads

Although the loss of optional uses for the land is considered to be a negative impact, the construction of the road is a positive and necessary intervention and any such loss of alternative use is the trade-off for a good road.

13.2.2 Accessibility

There will be an increased pressure on land and natural resources once the road is constructed. This will be caused by the desire to produce more especially mangoes and oranges due to easy access to the market.

13.2.3 Land Take

The loss of optional uses for the land is considered to be a negative impact, the construction of the road is a positive and necessary intervention and any such loss of alternative use is the trade-off for a good road. There will thus be direct land take as a result of upgrading the access roads to the site to murram or better standards.

13.2.4 Dust

Dust will be emitted during excavation and related earthworks during construction of all Contract components and especially digging of trenches for laying the proposed Pipeline. Air-borne particulate matter pollution is also likely to occur during the route clearance and excavation of the proposed Pipeline and for other facilities. This is likely to affect site workers and those residing nearby, in extreme situations leading to respiratory problems

13.2.5 Gender Parity Impacts

Women roles in road construction are mainly confined to supply of unskilled labour and vending of foodstuffs to the construction workers. There is need to promote gender equality in all aspects of economic development and more so in road construction.

13.2.6 Construction Waste

Project construction will involve earthworks and excavation. This will result in the generation of some spoil materials. Also wastes from pipe offcuts, wires and electronic waste.

13.2.7 Traffic Accidents

It is envisaged that with the improvement of the road, the traffic volumes and speeds will increase, and composition will change. This will cause increased frequency and severity of accidents.

13.3 Control Strategies for Impacts due to the Access Road

13.3.1 Resettlement Action Planning

This is a process involving land acquisition to be done before the contractor goes to site. Actions include;

- ✓ Formulate a detailed Resettlement Action Plan (RAP).
- ✓ Identify and list all the Project Affected People (PAP) by type of losses and extent of damages in an Entitlement Matrix.
- ✓ Consult Affected Persons (AP's) on, and offer choices among technically and economically feasible resettlement alternatives.
- ✓ Compensate those affected according to the official market rates.
- ✓ Provide allowances and other assistance to make a smooth transition after displacement.
- ✓ Implement an institutional structure or a mechanism for monitoring and evaluating the compensation/resettlement process.

13.3.2 Land Restoration

Restoration of land after road upgrading will be done. Depending on the planned future use for the site and the size of the excavation, pits and quarries to be backfilled with clean mineral soil or granular material, levelled or sloped and if necessary re-vegetated. They can also be used as pan for watering the animal. Reclamation plans shall be forwarded to NEMA or the Engineer.

The first choice for selecting a site for the construction camp shall be previously cleared sites or natural openings. This will minimize unnecessary clearing. Upon decommissioning construction camps and project management offices should be decommissioned such that they will be beneficial to the community

13.3.3 Dust Mitigation

It is recommended that a standard set of feasible dust control and air quality measures be implemented for all construction activities. The Proponent is committed to implementing measures that shall reduce air quality impacts associated with construction. All personnel working on the Project will be trained prior to starting construction on methods for minimizing air quality impacts during construction. This means that construction workers will be trained regarding the minimization of emissions during construction. Specific training will be focused on minimizing dust and exhaust gas emissions from heavy construction vehicles.

13.3.4 Construction Waste Management

The contractor to submit to the engineer a camp and site office plan defining all facilities to be created. These include human waste disposal facilities and solid waste management facilities.

The contractor to ensure that all waste materials at the point of construction are transported to a place of safe disposal.

13.3.5 Road Safety

Parking bays to be provided.

To reduce accidents, appropriate road signs and road markings to be put in locations where standards are compromised to warn drivers of safety hazards especially while approaching bends, junctions, bridges, schools and shopping centres.

Clearing of vegetation on the road reserve to improve sight distance and visibility.

Discouraging parking on the road by having shoulders throughout the length of the road

13.3.6 Gender Empowerment

Give equal employment opportunities for both men and women and encourage women to apply in skills they can be good at.

Expose and involve women in road construction and maintenance activities in an effort to transfer required skills to them.

Involve women groups in environmental management of the road operation such as planting trees and glass and in clearing bush along the road.

Enhance gender sensitivity and reduce gender discrimination in construction activities.

14 POWER GENERATION

14.1 Description

The project has a power generation component. It is expected to produce 960 kW of energy to serve the treatment works activities and sell the rest. Hydropower is generally a clean source of energy.

Most houses in the communities around the dam area are mud houses and lack proper ventilation. As the source of energy is firewood, there is a high risk of occurrence of indoor pollution resulting from incomplete combustion of the firewood.

Most houses in the communities along the Pipeline Route are semi-permanent and permanent houses. The household source of energy is still firewood and to some extent electricity for lighting and commercial activities.

In Nakuru Town, the people are connected to electricity but use it for lighting and commerce. The cost remains prohibitive compared to charcoal and firewood thus these two are still popular household energy sources.

The proposed hydro-turbines power generation facility considered for construction will supplement power supply thus ease the burden of power cost as the new facilities at the dam and treatment works are expected to use. However a stand-by electricity generator will be provided.

14.2 Potential Impacts on Environmental Values due to Power Generation

14.2.1 Reliable Supply of Electrical Energy

All processes in the treatment plant that rely on electricity will have reliable power supply. The same will benefit the other people who will use the same power.

14.2.2 Improved Electricity Supply In Support Of the Vision 2030 of the Government of Kenya

The country currently has shortfalls in power generation. This project will add to the power demands of the national grid.

14.2.3 Informal Sector Benefits

The power utility company's agency model will grow in the area. Agency shops to sell power tokens will be a revenue stream for local entrepreneurs.

14.2.4 Optimal Use of the Reservoir Water And Increased Value Of Land

When land is serviced with basic infrastructure, its value increases. The Ndoinet area will benefit from not just new roads but also electricity and clean water.

The raw water tapped from the reservoir for treatment will first generate power before treatment.

14.2.5 Improvement in Security As A Result Of Lighting

The facilities and their surrounding will be well lit. This will deter vandals and misfits.

14.2.6 Reduction in Pressure on Biomass Which Comes From Forest Resources

The local community that predominantly uses charcoal and wood fuel will have an alternatives source of energy; electricity.

14.2.7 More Energy Demand

There will be need for connection to the national grid during construction phase causing further strain on the limited power available.

14.2.8 Noise Pollution

The proposed area is relatively tranquil. The construction work at the proposed project is most likely to be a noisy operation due to the moving construction machines and vehicles. Also, the construction workers who will be working in the site will generate some noise as they are communicating to one another. This will be a potential source of disturbance at the site and surrounding neighborhoods of the proposed project.

During the operations phase, noise sources will be the hydro-turbines and backup generators.

14.2.9 Fire Hazards

Due to various construction activities at the proposed plant project, fire outbreaks can occur. Handling of inflammable products increases fire risks.

14.2.10 Oil Spills

The transferring of fuel Oil, from the tankers used for transportation, to the aboveground storage tanks and pumping for use to the backup generator sets could result in accidental oil spills.

This could lead to potential contamination of surface and groundwater as well as soil. Oil spills could also occur during the transportation of fuel by road using tankers.

14.2.11 Waste Oil Pollution

Waste oil is also an output of the construction machinery used in the project that poses potential environmental hazard in case of poor handling and disposal methods. This may affect the environment through water and soil contamination.

14.2.12 Occupational Health and Safety

There will be potential risk of occupational hazards that could lead to occupational accidents and during construction and operation phases of the project. Adverse impacts on the workers' health and safety is likely to occur especially through workers interaction with the equipment and machines during construction and operation of the plant. Accidents, injuries and diseases are likely to occur during project construction and operation and this could potentially harm the safety and health of the employees.

14.3 Control Strategies on Impacts due to Power Generation

14.3.1 Oil Spills, Oils and Grease in Hydro-Turbines

To prevent oil spills and environmental contamination, the power plant and pipelines should be designed with spill prevention and detection systems to protect the environment. With spill prevention and protection measures there should no adverse effects to the ground and surface water and soil. Need to design appropriate protection devices against accidental discharge of toxic substances (bases/airtight tanks for machines, reservoirs etc.).

The proponent and contractor will control the dangers of oil spills during construction by maintaining the machinery in specific areas designed for this purpose hence might not be a serious impact as a result of the construction of the Project.

The oiled and greased moving parts of the hydro-turbine should be contained in a chamber such that oils and greases do not leak into the blades that are in contact with water. In this way, water passing through the turbines will have no oils and greases hence proceeds to the treatment works for conventional treatment

14.3.2 Energy Demand

The project proponent and contractor shall ensure responsible electricity use at the construction site through sensitization of staff to conserve electricity by switching off electrical equipment or appliances when they are not being used. In addition, proper planning of transportation of materials will ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts. Complementary to these measures, the

proponent shall monitor energy use during construction and set targets for reduction of energy use.

14.3.3 Waste Oil Handling

If practicable, the maintenance works for all machinery and equipment will be concentrated in one area. Drainage will be installed with ring canals. All petroleum and related products will be stored bunded areas to contain possible oil leaks. Proper waste management will be strictly imposed

14.3.4 Fire Hazards

The proposed site must have firefighting equipment of high standards and in key strategic points all over the project site. Fire pumps, Hydrants, Sprinkler/water spray systems, Hose houses, Dry chemical systems, Carbon dioxide systems, Detection/alarm systems, Portable fire extinguishers among others shall be installed at the site. A fire evacuation plan must be posted in various points of the construction site including procedures to take when a fire is reported. All workers must be trained on fire management and fire drills undertaken regularly.

14.3.5 Minimization of Worker Accidents and Hazards

To reduce the workers accidents and hazards during the construction phase of the proposed project, the contractor and proponent are expected to adhere to the provisions of the Occupational Safety and Health Act, 2007 and its subsidiary legislation.

It is the responsibility of the project proponent and contractor to provide a safe and healthy environment for construction workers as outlined in the EMP. A Response and Evacuation Plan must be in place in addition to safety education and training shall be provided to the employees.

15 MITIGATION MEASURES FOR ADVERSE IMPACTS

To promote the project affected communities, their living standards should be better off after the project implementation, not worse.

The Consultant was guided by the Sustainability Assessment Management (SAM) approach in designing and seeking after executable mitigation measures for potential impacts identified through stakeholder engagement, expert knowledge and engineering design. The main objectives were to maximize social, environmental and economic benefits of the project design and to minimize the adverse effects of conflicts among the three pillars:

To integrate sustainability into the RVWSB's day-to-day project operations, the headquarters and regional offices will routinely consider the following principles in their decisions and actions, as appropriate:

- ✓ Conserve, protect, restore, and improve the supply and quality of natural resources and environmental media (energy, water, materials, ecosystems, land, and air) over the long term;
- ✓ Align and integrate programs, tools, incentives, and indicators to achieve as many positive outcomes as possible in environmental, economic, and social systems; and,
- ✓ Consider the full life cycles of multiple natural resources, processes, and pollutants in order to prevent pollution, reduce waste, and create a sustainable future.

The execution of the control strategies will provide the RVWSB with opportunities for collaboration.

15.1 Proposed Control Strategies for cross cutting issues

15.1.1 Employment Opportunities

Employing as many people as possible from the locality especially unskilled workforce will help them accept skilled labour from outside. This will promote cohesion and the spirit of the project.

15.1.2 Settlements and Encroachment

Forest authorities will need to be more vigilant to contain attempts at encroachment and related vices like charcoal burning and illegal logging.

15.1.3 Workers Safety

Ensure consistent use of PPE by workforce. The contractor should commit himself to strict implementation of OSHA regulations during construction and operations.

15.1.4 Residents' Safety

Fencing off the reservoir area and conducing frequent patrols both by boat and walking around.

15.1.5 Landscape Aesthetics

Rehabilitation of disused quarries to safe standards or reconstruct them for reuse by the community.

15.1.6 Responsible Utilization of Scarce Construction Materials

The contractor will promote responsible utilization of scarce construction materials so as to let the community share in them. This might include fetching some materials from far away if whatever is available is only enough to sustain the community's needs.

15.1.7 Vandalism of Valves along the Pipeline

Rift Valley Water Services Board through the relevant water Companies shall employ staff who will scout the pipeline and ensure that the valves are not stolen. In addition, the measures will be taken to include materials that are not susceptible to theft.

The community will also be educated not to tamper with the valves as tampering with the valves interfere with the system and also leads to wastage of water that would have been used by the community.

15.2 Mitigation for Noise Impacts

The mitigation measures proposed in the EMP in regard to environmental health and safety seek to ensure that personnel are protected from excessive noise and vibrations emanating from project activities through training on the importance of self-protection, provision of PPE and through regulated construction scheduling.

The noise criteria are as set out in the First and Second Schedule of the regulations.

Vibration performance criteria will be identified as vibration related impacts are likely during earthworks and at quarry sites. To ascertain noise levels expected during operations, documented findings will be used.

There are no established standard criteria relating noise and animal behavior. In past sound studies, sudden, novel sounds have a larger effect on behavior. Effects decline as animals become accustomed to sounds. Some of the control Strategies include:

15.2.1 Noise Barriers

Noise mitigation may be achieved through a variety of measures that modify the noise source, noise path, or receiver characteristics. To be effective, noise barriers must be continuous, denoting some form of enclosure.

However, for large construction sites noise barriers will not be economically practical and are not cost effective. Other noise mitigation measures aimed at reducing noise levels should be explored such as;

- ✓ Install portable barriers to shield compressors and other small stationary equipment where necessary;
- ✓ Use of quiet equipment (i.e. Equipment designed with noise control elements);
- ✓ Limit pick-up trucks and other small equipment to a minimum idling time and observe a common sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible;
- ✓ Provision of appropriate personnel protective equipment; and
- ✓ Construct mainly during the day.

15.2.2 Attention to Sensitive Receptors

Studies have shown that at least half the people living within 50m of either side of a site boundary are seriously concerned by construction nuisance in one form or another. Beyond 100m, less than 20% are concerned.

Noise exposure of the sensitive receptors should be assessed and the noise mitigation measures applied accordingly where possible.

Other remedial actions against construction noise may include:-

- ✓ Notify landholders of construction works in advance of commencement of works. Provide information on likely timing and duration of works and contact details of responsible persons in the event of questions or complaints;
- ✓ Notify landholders of any proposed blasting activities; and
- ✓ Notify landholders of any proposed night time construction works.
- ✓ The Selected Contractor to prepare for approval by RVWSB a Health Management Plan (HMP) detailing means to protect construction workers and third parties from excessive noise and vibrations that would adversely impact their health during the construction.

Other regulatory requirements as set out in the regulations:

Part IV- Provisions Relating To Licensing Procedures for Certain Activities

16. License.

(1). Where a sound source is planned, installed or intended to be installed or modified by any person in such a manner that such source shall create or is likely to emit noise or excessive vibrations, or otherwise fail to comply with the provisions of these Regulations, such person shall apply for a license to the Authority.

Generally, the residential and other neighborhoods who (would like to) derive value such as trade and employment opportunities and even rise in property value accruing

to the micro-economic environment that the Project presents due to their close proximity, have to contend with the construction and operation noise. Simply said, the Project and associated noise should be looked at and seen as a "necessary evil", a kind of symbiotic relationship between the natural and built environment.

15.3 Mitigation for Air Quality Impacts

The mitigation measures proposed in the EMP especially during construction in regard to environmental health and safety seek to ensure that personnel are protected from excessive dust emanating from project activities through training on the importance of self-protection, provision of PPE and through introduction of measures that intercept transmission of dust and other air pollutants likely to be generated to sensitive receptors when it cannot be entirely avoided.

Environmental protection objectives include the following:

- ✓ To avoid impacts on human health and amenity arising from particulate emissions;
- ✓ To minimize dust emissions beyond 100 m of construction activities; and
- ✓ To minimize Greenhouse Gas Emissions.

Controlling dust emissions and air quality that are likely to take place during construction phase of the proposed Project is useful in minimizing nuisance conditions. It is recommended that a standard set of feasible dust control and air quality measures be implemented for all construction activities. The Proponent is committed to implementing measures that shall reduce air quality impacts associated with construction. All personnel working on the Project will be trained prior to starting construction on methods for minimizing air quality impacts during construction. This means that construction workers will be trained regarding the minimization of emissions during construction. Specific training will be focused on minimizing dust and exhaust gas emissions from heavy construction vehicles.

Some of the Air Quality Control Strategies include:-

15.3.1 Dust or Particulate Matter (PM)

A large part of the project area, especially near the dam receives rainfall for the better part of the year i.e. 9 months; this will assist in keeping dust levels manageable during construction.

In the rest of the areas dust emissions will be controlled by the following measures:

- ✓ Wetting all active construction areas as and when necessary to lay dust;
- ✓ Appropriately cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard;

- ✓ Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites; and
- ✓ Sweep when necessary (with physical sweepers) all paved access roads, parking areas and staging areas at construction sites.

15.3.2 Air Emissions

The expectation is that emissions from these sources may well be within air quality criteria both in terms of in-air concentrations and dust deposition as well as the fact that residents of the project neighborhoods are most likely already exposed to diesel emissions at levels several times higher than that from the equipment.

The following practical measures shall be implemented during construction to minimize the exhaust emissions:

- ✓ The engine size of the construction equipment shall be the minimum practical size;
- ✓ The number of construction equipment operating simultaneously shall be minimized through efficient management practices;
- ✓ Construction equipment shall be maintained in tune per the manufacturers specifications;
- ✓ Vehicle idling time shall be minimized; and
- ✓ Equipment shall be properly tuned and maintained

Ideally, the both contractor and operator could explore the place of use of other forms of energy e.g., use of biodiesel in diesel engines like generators if feasible.

Overall, Climate, air quality and physical features are not predicted to be impacted upon significantly, other than in the short term and this can be mitigated against.

15.4 Control Strategies on Water Resources Management and Water Quality

The mitigation measures proposed in the ESMMP in regard to surface and ground water seek to ensure that water quality standards as stipulated in *EMCA, Water Quality Regulations (2006)* are protected through:-

- ✓ Avoiding degradation of water quality due to construction or operation of the Project; i.e. Discharges of process wastewater, sanitary wastewater, wastewater from any operations or storm water to surface water should not result in contaminant concentrations in excess of local ambient water quality criteria or, in the absence of local criteria, other sources of ambient water quality.
- ✓ Avoiding impacts on other water users arising from construction or operation of the Project; and
- ✓ Minimizing alteration to catchment hydrology, including localized drainage patterns.

Proposed control strategies include the following:

15.4.1 Catchment Conservation

The Proponent of the proposed project can arrange to be paying an annual land rent for the area occupied by the tunnel within the forest and the pipeline to the Kenya Forest Service (KFS). This rent is a guaranteed source of income to the KFS and will go a long way enhancing its activities mainly forest conservation. In addition, the Proponent will be paying water abstraction fees to the Water Resources Management Authority (WARMA). According to the Water Act 2002, a certain percent of this fee will go to the Catchment Area Advisory Committee (CAAC) to help in catchment conservation.

This will in turn help improve water quality and quantities flowing into the reservoir.

15.4.2 Pollutants from Hydro-Turbines

The impact of the oils can only be felt if the levels exceed some maximum contaminant levels anticipated in the regulations. These levels have been set at Nil in the WQR meaning the oils and greases should not be in the detectable range.

The oiled and greased moving parts of the hydro-turbine should be contained in a chamber such that oils and greases do not leak into the blades that are in contact with water. In this way, water passing through the turbines will have no oils and greases hence precedes to the treatment works for conventional treatment.

Further study should ascertain if the impacts are only aesthetics related or include health related issues.

15.4.3 Fisheries

The communities currently using the river's waters are not keen on fishing. In fact they hardly consume fish. It is logical to conclude the community will not be affected. However, once the reservoir is in place, the proponent will introduce the fishing culture to supplement the community's food basket.

15.4.4 Runoff

If polluted, it can be treated in septic tanks before release. Proper channels will be constructed to handle excess runoff to prevent soil erosion.

15.4.5 Sedimentation

- Hydraulic removal of sediment (flushing, sluicing, release of density currents)

- Increase frequency of releases when sediment load of inflowing water increases.
- Ensure catchment protection and watershed management Control land use in watershed, prescribed distances of fields in relation to the dam

15.4.6 Inter-Basin Water Transfer

The inter-basin water transfer does not infringe the Nile agreements. This has been found to be negligible in the light of the Itare River's contribution to Lake Victoria basin. However the receiving basin will need to adjust to the new quantities of inbound waters. The increased volumes of wastewater will require expansion of existing wastewater treatment facilities.

15.5 Control Strategies on Waste Generation impacts

The following performance criteria are proposed for waste management: All waste materials are handled and stored in a safe and appropriate manner; there is no environmental impact on, and disturbance to, the surrounding environment from waste; the construction equipment is maintained in a clean and tidy manner; and no waste is to be disposed of in the marine or terrestrial environment or incinerated.

Proposed control strategies on waste generation impacts include the following:

15.5.1 Sustainable Use of Resources

Environmental sustainability concerning the use of resources relates to two main issues – to reduce the consumption of resources and to adopt recyclable materials where possible. Water systems comprise significant amount of structures and mechanical fittings. Design of these systems should take into consideration the optimization of the size of the structures to reduce the volume of concrete and other construction materials used and the volume of soil to be disposed.

As far as recycling is concerned, the Proponent/contractor should apply the concept of 'sustainable procurement' which involves a life-cycle thinking of an asset. The costs of products should take into account the full costs of their production, their use and their scrappage. This life-cycle thinking relates to the consideration of supply chain impacts and the social and environmental responsibility of contractors when selecting materials for construction and operation. For instance, it would be desirable if certain components of a system could be recycled or reused at the time of asset replacement. Extensive application of such strategy could result in significant reduction of waste emanating from the installation.

Other mitigation measures will relate to;

15.5.2 Handling Of Cleared Vegetation and Transportation,

- ✓ Minimize vegetation clearing where possible
- ✓ Ensure vegetation materials are mulched and used onsite for rehabilitation and vegetation works
- ✓ Ensure larger vegetation materials such as hollow logs and hollow bearing trees are stockpiled for use in rehabilitation activities or placed in adjoining bush land.
- ✓ As for the mature trees in the forest where the pipeline passes, arrangements can be made with KFS for proper harvesting.

15.5.3 Construction Waste Management

- ✓ Ensure detailed design and specifications are undertaken so as to minimize the generation of waste during construction and the durability of materials is considered
- ✓ Locate material and stockpiling areas within the construction corridor until its ultimate destination is determined
- ✓ Appropriately manage stockpile areas and storage areas
- ✓ Dispose non-recyclable construction materials at a licensed waste facility and avoid fly-tipping
- ✓ Ensure used furniture and equipment from decommissioning is sold off/reused or donated to charity where possible. Otherwise dispose of at an appropriately licensed landfill
- ✓ Recycle steel off cuts or scrap or send it to scrap metal recycler
- ✓ Recycle any ballast that cannot be reused as ballast and remove excess ballast and clean fill off site for reuse, as possible

15.5.4 Spoil From Earthworks

- ✓ Where safe and feasible, reuse spoil onsite as backfill or as non-load bearing fill
- ✓ Transport any surplus spoil that cannot be reused off-site to an approved landfill site or to borrow pits

15.5.5 Sludge and Related Waste Disposal

- ✓ Store all chemicals, used oils, oily rags, solvents, lubricants and fuel in covered and banded areas

15.5.6 Domestic Waste Disposal

- ✓ After the construction of the Project is over, all little informal settlements have no reason to stay, and local authorities have to take responsibility for this.

- ✓ Ensure garbage is removed by an appropriate licensed contractor
- ✓ Set up designated waste transfer areas
- ✓ Store recyclable waste separately from residual/non-recyclable waste
- ✓ Provide recycling bins around workers' camps, site offices and amenities

15.5.7 Wastewater Disposal

- ✓ There will be septic tanks for disposal of wastewater from staff housing. Besides it will introduce a culture of proper sanitary practices especially in the dam area.

15.5.8 Reservoirs Safety

- ✓ Clean up any litter on the lake and land facilities and quickly act to remove litter which could affect operational safety.

15.6 Environmental Protection Control Strategies for the Terrestrial Ecology

The main objective is to ensure minimal impact upon terrestrial flora and fauna from the construction and operation of the Project. Protection of these endangered and threatened flora and fauna species is crucial to securing livelihoods and to consequently reducing poverty levels—which is currently high in order to attain social equity at the scale anticipated by the social pillar of Vision 2030.

Proposed control strategies are as follows:-

15.6.1 Habitat Conservation

Avoid fragmentation or destruction of critical terrestrial and aquatic habitats by siting pipelines, yards, support facilities, and maintenance roads to avoid such locations or by utilizing existing transport corridors whenever possible.

Where fragmentation of critical habitats cannot be avoided, maximize the availability of animal crossings.

15.6.2 Invasive/Loss of Species

Employ an ecologist or a qualified fauna spotter to accompany clearing of woody vegetation during set out;

Develop a flora and fauna species relocation plan particularly for threatened species;

Restrict the extent of clearing to the minimal amount necessary particularly in locations containing endangered plant and animal species;

Map and clearly mark on the ground the locations of populations of species of conservation significance;

15.6.3 Erosion Control

The various methods used in erosion control are collectively called upstream engineering. They consist of soil conservation measures such as reforestation, check-dam construction, planting of burned-over areas, contour plowing, and regulation of crop and grazing practices. Also included are measures for proper treatment of high embankments and cuts and stabilization of stream banks by planting or by revetment construction.

One phase of reforestation that may be applied near a reservoir is planting of vegetation screens. Such screens, planted on the flats adjacent to the normal stream channel at the head of a reservoir, reduce the velocity of silt-laden storm inflows that inundate these areas. This stilling action causes extensive deposition to occur before the silt reaches the main cavity of the reservoir. Use of vegetation screens, debris barriers, or desilting basins above a reservoir should be planned with future development in mind. For instance, if the dam is raised at a later date, the accumulated silt in this area would detract from the added storage that might otherwise have been obtained.

15.6.4 Afforestation and Reforestation

Promote tree planting using KFS, CBOs and campaigns. Ways to achieve this include Clearly identify the extent of areas to be cleared and those that must not be cleared or damaged on construction plans and in the field;

15.6.5 Climatic Modifications

The introduction of a large body of water into a relatively enclosed upland valley is likely to substantially increase humidity and may have an advantageous effect on forest growth and agriculture. It has not been possible in this preliminary assessment to substantiate or quantify this impact.

15.6.6 Vegetation

Erect temporary fencing around the construction zones in accordance with an approved site management plan;

Right-of-way boundaries and sensitive areas shall be clearly marked with flagging tape prior to clearing.

Right-of-way clearing will be limited to the area required for construction, operation and maintenance of temporary diversion routes and permanent alignment.

15.6.7 Hazards to Life

If any pits/trenches are to remain open after daily site works have completed, ensure they are securely covered by an impenetrable barrier,

15.6.8 Forest Fires

Monitor wayleave vegetation according to fire risk; remove blow down and other high-hazard fuel accumulations; time thinning, slashing, and other maintenance activities to avoid seasons when the risk of forest fires is high;

15.7 Control Strategies on Aquatic Ecology Impacts

The main objective is to ensure minimal impact upon aquatic flora and fauna from the construction and operation of the Project. Some proposed control strategies are as follows:-

15.7.1 Monitor the Presence of Disease Vectors

- ✓ Contribute to strengthening of local health facilities through public enlightenment
- ✓ Contribute public health programs to eradicate / protect against malaria, *Schistosomiasis* &, etc.

15.7.2 Growth

- Monitor for any unusual floral species
- Remove such species when seen.

15.7.3 Water Quality Issues

- ✓ Adequately divert the river away from construction areas
- ✓ Ensure good practices
- ✓ If the quality of the water has deteriorated or if their presence is suspected, relevant and competent authorities shall determine the concentrations of pesticides, heavy metals, cyanides, nitrates, and phosphates. If the water shows a tendency toward eutrophication, relevant authorities shall check for ammonia and total nitrogen.
- ✓ Ensure in-stream flows are maintained via a flow diversion system

15.7.4 Introduce Rare and Unique Species or Ecosystems

Some species can be beneficial.

15.8 Control Strategies for Land Management Impacts

The objectives of the Control strategies will be to:-

- ✓ Minimize impacts on land based resources including good agricultural soils, agricultural productivity and pastureland and wildlife reserves
- ✓ Avoid environmental harm and reduced soil productivity arising from release of sediments, salinization of soil, disturbance of contaminated soils and contamination of soils
- ✓ Minimize topographic and drainage changes minimize disruption to infrastructure

- ✓ Avoid accidental damage to existing infrastructure and services
- ✓ Protect soil resources such that rehabilitation is successful.

Mitigation will relate to effective landscape planning and to the consideration of the landscape and visual impacts of all the developments relating to the dam.

Mitigation to land take will require that all Project Affected Persons (PAPs) be compensated adequately bearing in mind that the project intends not to leave them neither poor nor richer except in using their own efforts to benefit from it.

Some of the proposed control strategies are asfollows:-

15.8.1 Resettlement Action Planning

This process will lead to identification of the PAPs throughout the project alignment. It will identify what each PAP is entitled to be it compensation for loss of land or loss of livelihood. Land acquisition will need to be done before the contractor goes to site. It will involve;

- ✓ Formulating a detailed Resettlement Action Plan (RAP) process.
- ✓ Identify and list all the Project Affected People (PAP) by type of losses and extent of damages in an Entitlement Matrix.
- ✓ Consult Affected Persons (AP's) on, and offer choices among technically and economically feasible resettlement alternatives.
- ✓ Compensate those affected according to the official market rates.
- ✓ Provide allowances and other assistance to make a smooth transition after displacement.
- ✓ Implement an institutional structure or a mechanism for monitoring and evaluating the compensation/resettlement process.

15.8.2 Restoration of Land

Depending on the planned future use for the site and the size of the excavation, pits and quarries to be backfilled with clean mineral soil or granular material, levelled or sloped and if necessary re-vegetated. They can also be used as pan for watering the animals. Reclamation plans shall be forwarded to NEMA or the Engineer.

15.8.3 Construction Camps

The first choice for selecting a site for the construction camp shall be previously cleared sites or natural openings. This will minimize unnecessary clearing.

Upon decommissioning construction camps and project management offices should be decommissioned such that they will be beneficial to the community

15.8.4 Gender Considerations

- ✓ Gender equity in compensation both at work and in resettlement.
- ✓ Ensure payment is to affect women especially the vulnerable ones such as widows or orphans because relatives like oppressing them.

15.8.5 Resource Renewal Reforestation

Undertake rehabilitation planting where possible to replace vegetation that provided screening to adjacent sensitive visual receptors; and in conjunction with the forests agency replant indigenous species cut down.

Retain erosion and sediment control devices until rehabilitation success (80% cover) has been achieved.

15.8.6 Soil Contamination

If contaminated land is identified further investigate and develop a remediation plan;

Develop appropriate management and disposal methods for contaminated soils and other materials;

Dispose of contaminated soils to authorized facilities on-site or off-site in accordance with disposal permits;

Design fuel, oil and chemical storage areas in accordance with Kenyan Standards;

15.8.7 Erosion and Control and Terracing

- ✓ If dispersive soils are necessary to be incorporated as construction material, undertake appropriate treatment of the soil first;
- ✓ Undertake appropriate measures required to stabilize the soil moisture content of shrink and swell soils;
- ✓ Manage works during the wet season and erosive rainfall events bearing in mind that mud slips can occur and can be hazardous.
- ✓ Appropriately manage works and avoid increasing the risk of erosion;
- ✓ Manage soils that are at risk of becoming waterlogged;
- ✓ Manage acidic and alkaline soils;
- ✓ Rehabilitate disturbed areas once construction is completed;
- ✓ Develop and implement erosion and sediment control management plan;

15.9 Control Strategies and Objectives for Services Delivery Impacts

It is important to safeguard and maintain in operating condition existing services. The respective bodies/lead agencies holding these services have a legal mandate to

deliver respective services to citizens. This mandate must be safeguarded during the Project execution.

Some temporary disruption is inevitable. However, efforts will be made to minimize its occurrence, for example by development phasing, routing of construction traffic and phasing of the local road network

15.9.1 Inform All Service Consumers

Inform all service consumers, in sufficient lead time, of intended interruptions, of how long the interruptions are likely to be and for what reason

15.9.2 Considerate Construction Scheduling

For services to be closed /interrupted for the duration of the project construction, the schedule of the construction work will be designed to keep the service interruptions at a minimum.

15.9.3 Institute the Process of Resumption of Service

Restore or institute the process of resumption of service upon completion of disruption

15.9.4 Proper Planning

Allowing developments in the serviced areas to match what is planned for will ensure residents enjoy quality services from all utility providers.

15.10 Control Strategies and objectives on Cultural Heritage Impacts

The objective of the control strategies is to ensure protection, conservation and transmission of the cultural and natural heritage of Kenya's people

Some actions to this end, which largely will be instituted during and beyond planning phase include: -

15.10.1 Cultural Conflicts

- ✓ To recognize, respect and protect cultural and natural heritage and social bonding during Design Phase, Construction Phase and Operation Phase of the Project.
- ✓ Ensure community participation in decisions regarding heritage conservation, and realize that the cultural and spiritual importance of heritage sites and properties may be very location-specific.
- ✓ Educate workers on the cultural sensitivities in the host communities.
- ✓ Culture clash -Identify with the host communities during festivals

15.10.2 Social Problems

- ✓ Educate workers on the cultural sensitivities in the host communities.
- ✓ Educate workers on responsible sexual practices.

15.10.3 Cultural Assets

- ✓ The client, RVWSB, to spare no efforts in showing important social responsibility in relation to the preservation of cultural assets of affected communities. This can be achieved in part by stakeholder participation of community representatives in order to capture value and incorporate this to the Project, especially during operation phase. This will help the communities to not only protect economically valuable physical assets, but also preserve its practices, history, and environment, and a sense of continuity and identity.
- ✓ If identified, provide storage facilities for movable heritage properties so that they are not looted, sold, or removed from the community.
- ✓ Ensure that temporary camps for worker accommodation of project management offices for the Project are not located so where they create risks to heritage sites or properties.

15.11 Control Strategies on Environmental and Health and Safety Impacts

The RVWSB will provide training for operation personnel and will adopt other safety measures; however, there still remains the possibility of some risks to health and safety of operation personnel due to inappropriate handling, or accidental release of chlorine or other chemicals at water treatment plants.

The following are some of the proposed control strategies.

15.11.1 Fire Prevention Measures

- ✓ The project site especially water treatment plant must have in place appropriate and adequate firefighting equipment of recommended standards and in key strategic points.
- ✓ A fire alarm system should be installed in the plant.
- ✓ A fire evacuation plan must be posted in various points of the project site including procedures to take when a fire is reported. All workers must be trained on fire management and fire drills undertaken regularly.
- ✓ A fire assembly point must be identified and labeled accordingly.

15.11.2 Dam Failure Safeguards

It needs to be recognized that the situation downstream of the dam may change over time and place the dam into a higher hazard category during the life of the dam. For example, downstream changes may include the development of new infrastructure,

such as housing development where the Population at Risk (PAR) and the severity of damage and loss becomes greater than when the dam was first built.

Hence this may make the dam deficient in its safety requirements, such as the size of the spillway and a higher safety risk. A suitably qualified and experienced dam engineer should be consulted if it is apparent that this may occur. When estimating the PAR the following issues were taken into account:

- ✓ Groupings of dwellings.
- ✓ Roads and railway lines.
- ✓ Camping areas and occupancy times.
- ✓ Allowance for itinerants (fisherman, bushwalkers, birdwatchers, and picnickers).
- ✓ River crossing and bridges.
- ✓ Occupation of schools, factories, retirement homes, hospitals, institutions, commercial and retail areas.

15.11.3 Occupational Hazards

Injury

- ✓ Keep unauthorized persons away from dangerous zones
- ✓ Put warning signs (written in English and local languages) at strategic sites
- ✓ Ensure regular monitoring of embankment and spillway

Drowning

- ✓ Regular patrols
- ✓ Fencing
- ✓ Train and employ Life guards,
- ✓ Provide Life saver equipment

15.11.4 Diseases

Malaria and other diseases

- ✓ Enlighten personnel and community about Malaria and use of mosquito nets.
- ✓ Partner with NGO's in campaign for proper sanitation and hygiene
- ✓ Help strengthen healthcare system

AIDS

- ✓ Enlighten personnel and community about STD's (HIV/AIDS) and use of condoms.
- ✓ Partner with NGO's in campaign to stop the spread of HIV/AIDS.
- ✓ Help strengthen healthcare system

15.11.5 Overall Dam Safety

Implementation of Dam safety plans that will cover

- ✓ Operation of equipment at the dam
- ✓ Reservoir inflow and flood forecasting
- ✓ Authorizing spillway flood releases
- ✓ Recording reservoir data
- ✓ Routine inspection
- ✓ Maintenance
- ✓ Modification
- ✓ Correct method of opening and closing gates
- ✓ Dam safety and surveillance.

16 THE ESMP

16.1 Roles, Responsibilities for Environmental and Social Management

A number of parties have responsibilities in relation to the implementation of the EIA mainly in the execution of the Environmental and Social Management Plan (ESMP).

The impact of an environmental effect is more often not directly measurable in terms of money as are the costs of a piece of hardware. This is a setback when one wants to take the environmental aspects into consideration in the societal cost benefit optimization of a large project design such as the Itare Dam Water Supply Project. The consultant has however developed methods to monetarise the impacts of all kinds of environmental effects and have come up with tools to express these impacts in terms of money by following fundamental principles of economics.

16.2 Costs of Environmental and Social Management

Described below are the three categories of the commonly practiced techniques together with a description of their characteristics.

16.2.1 Market Value Approaches to Costing

These techniques derive value from comparisons of costs and revenues. The price or cost of the environmental resource is used and these are easily observable in market data for prices. Parameters checked for variation will include;

- ✓ Change in productivity - change in availability, quality or quantity of an output
- ✓ Change in income – change in availability, quality or quantity of an output
- ✓ Replacement cost – for individuals, groups or society replace an entire asset, part of an asset, or quality of an asset,
- ✓ Preventative expenditure – if/how much individuals, groups or society spend money to defend their environment
- ✓ Relocation cost –for individuals, groups or society relocate an activity or assets

16.2.2 Surrogate Market Approaches to Costing

These techniques derive value from comparisons of costs and revenues in related markets. This will look for prices or costs of surrogate goods or services. Elements of consideration are;

- ✓ Value of close substitute- is in effect taken as value of affected interests
- ✓ Wages to labour- change in wages depicts value of change in environment
- ✓ Market prices of good with an environmental characteristic- change of its price indicates change in characteristics as well.

16.2.3 Simulated Market Approaches to Costing

These techniques derive value from hypothetical questions because there are no observable market data on prices or costs. It answers questions simulating a market situation. Techniques involved include;

- ✓ Trade-off game between alternatives each with a different level of environmental effect,
- ✓ Contingent valuation -purchasing of an environmental good/service or asset.(willingness to pay)
- ✓ Contingent ranking – comparison of environmental effects with other effects
- ✓ Priority evaluator – choice of quantities to purchase in market setting

Broadly; responsibility for environmental and social management will be assigned as shown in Table 16-1:

Table 16-1: The Proposed Environmental and Social Management Plan (ESMP)

Impact Area	Time frame	Source / Impact	Nature	Mitigation plan	Party Responsible	Costs
NOISE & VIBRATION		Construction equipment and activities, mainly occurring along the alignment, quarry and borrow sites Along roads and tracks used to bring materials and equipment to the alignment		Contractor to agree noise limits/ noise control stations with NEMA and obtain a Construction Noise Permit prior to the commencement of construction work Positioning Powered Mechanical Equipment (PME) so that noise is directed away from sensitive areas;		
	Construction	Where blasting operations will be required including Quarry operations Shaft sinking in case of tunneling, bridge piles Tunneling through either D&B or TBM methods Demolitions by implosion Workers camps Blasting & drilling at Tunneling sites	Reversible Significant Short-term	Harmonized sleeping time Contractor to prepare for approval by RVWSB a Health Management Plan (HMP) detailing means to protect site workers and community from excessive noise and vibrations	Contractor Supervising Engineer	
AIR QUALITY	Construction	Construction machinery Vehicle movements over unsealed surfaces; Exposure of soils to wind erosion. Wind erosion of open active areas. Material handling and temporary stockpiles;		Use of Personal Protective Equipment (PPE) by workers and all visitors to the site Use equipment fitted with water suppression to minimize the amount of dust	RVWSB , Supervising engineers, contractor	

		Spoil transportation; and Small concrete batching plant activity Greenhouse Gas (GHG) emissions arise from Products of combustion from fuel burning vehicles and equipment; smoke from agricultural waste and pastureland burning; Quarrying activities; and Vehicle movements on earth roads The amount of carbon dioxide emission is a leading environmental effect produced by vehicles				

WATER RESOURCES MANAGEMENT	Construction & Operations	Potential sources of water pollution include site runoff and drainage from construction activities in the sites, effluent from general construction activities and sewage effluent from the construction workforce. Storm water discharge and flow re-direction with its attendant impacts such as flooding privately owned land, inundation of farms with growing crops, Excess pressure on scarce water resources especially in the drier areas such as the Rift Valley sections with inland drainage Blockage of drainage ways along the pipeline alignment		Storing oils and fuels in designated areas which have pollution prevention facilities; Using solid-fabric waterproof materials to cover all stockpile areas during rainstorms; Collecting construction phase discharge in a temporary drainage system and then treating or desilting it on-site before discharging it to storm water drains or river Cleaning all vehicles and plant before leaving a construction site Stabilize bed and banks of streams as immediately after construction; As far as possible construct stream crossings in the dry season; Restore drainage patterns as closely as possible post construction; Minimize any filling, draining, damming or alteration of waterways; especially along pipeline route Obtain construction water from existing allocations where possible.	RVWSB , Supervising engineers, contractor	
WASTE MANAGEMENT		Vegetation clearing and transportation, Typical construction wastes including packaging, surplus construction materials such as		Ensure larger vegetation materials such as hollow logs and hollow bearing trees are stockpiled for use in rehabilitation activities or placed in adjoining bush land;	RVWSB , Supervising engineers, contractor	

		timber, concrete, gravel, metals and plastics, Surplus spoil from earthworks and drainage construction, Electrical and telecommunications cabling off-cuts, and Typical domestic waste - to be generated from occupation of accommodation villages. Demolition wastes Decommissioned furniture Chemical waste from the maintenance of construction plant and equipment Abandoned construction materials such as ballast		Enforce littering by-laws Hygiene, Environmental education and awareness to members of the public to alleviate ignorance Where safe and feasible, reuse spoil on site as backfill or as non-load bearing fill; Ensure garbage is removed by an appropriate licensed contractor; Transport any surplus spoil that cannot be re-used off-site to an approved landfill site or to borrow pits; Provide recycling bins around accommodation villages, site offices and amenities; Store all chemicals, used oils, oily rags, solvents, lubricants and fuel in covered and banded areas; Ensure used furniture and equipment from decommissioning is sold/re-used or disposed of at an appropriately licensed landfill; After the construction of the project is complete, all little informal settlements have no reason to stay, and probably local authorities have to take responsibility for this. There should be no disposal of material in environmentally sensitive areas, e.g.	Public Health Office	

				Wetlands, protected vegetation, and the marine environment. Proper restoration of materials extraction sites, borrow pits or quarries		
TERRESTRIAL ECOLOGY		Removal of top soil, excavation and mass haulage will expose the land to elements of erosion such as wind and water and thus will trigger the process of land degradation Loss of nesting sites and other wildlife habitat through bush clearing impacts associated with clearing include: removal of trees, shrubs and wildlife habitat, changes to soil water, temperature and fertility in adjacent areas, erosion and fire hazards due to slash stockpiling Introduction of invasive plant or animal species in the ecosystems e.g. Prosopis juliflora (mathenge), water hyacinth		Contractor to Develop and implement an erosion and Sediment Control Plan Restrict the extent of clearing to the minimal amount necessary particularly in locations containing endangered plant and animal species; Where possible locate all construction facilities such as equipment storage, offices and accommodation villages within already cleared areas; By transplanting significant species as a means of conservation where it is not possible to avoid felling, translocate to a suitable site elsewhere; Work with forest agency, CBOs to do reforestation within project area to compensate for trees felled during construction	RVWSB Design engineers, Supervising engineers, contractor	

AQUATIC ECOLOGY		Habitat alteration and fragmentation of marine habitat; Disruption of watercourses; Establishment of non-native invasive plant species; Creation of barriers to wildlife movement; Visual and auditory disturbance due to the presence of machinery, construction workers, and associated equipment. Sediment and erosion from construction and storm water runoff may increase turbidity of surface waters		Ensure all construction machinery and materials bought onto site are weed, seed and mud free and have undergone a thorough inspection; Rehabilitate disturbed ground surfaces as soon as practical; Avoid fragmentation of aquatic habitats; Collecting construction phase discharge in a temporary drainage system and then treating or desilting it on-site before discharging it to storm water drains or river Contractor to Develop and implement an erosion and Sediment Control Plan	RVWSB Design engineers, Supervising engineers, contractor	

LAND MANAGEMENT	Planning, Construction & Operation	Land take Loss of buildings & other assets Social disruption and standards of resettled people Environmental degradation from increased pressure on land Loss of vegetation in land clearing for the tracks, stations, grade crossings, and associated service roads Fuel storage and soil contamination as a result of these, disturbance and possible migration of contaminants Loss of good quality agricultural and pastureland soils Exposure of soils to erosive forces and subsequent erosion of valuable topsoil resources during the construction and operation phase	Long term irreversible	Land acquisition to be done through a detailed RAP before the contractor goes to site Undertake a detailed geotechnical investigation prior to construction of the water transmission pipeline and develop an earthworks schedule Prior to excavation and blasting, identify locations of all infrastructure and services and provide measures to protect from impacts. Include drainage requirements in design such that concentration of flow does not occur and erosion is avoided Develop appropriate management and disposal methods for contaminated soils and other materials; Proper restoration of materials extraction sites, borrow pits or quarries Replenish nutrients of agricultural soils that are disturbed during construction and are not within the project's acquired corridor; Design fuel, oil and chemical storage areas in accordance with Kenyan Standards;	RVWSB	As in RAP report

SERVICES DELIVERY IMPACTS		The mandate of the following bodies to deliver respective services in their areas of jurisdiction may possibly be compromised during the project planning and implementation. Kenya Power Water Service Boards Water Services Providers Road Authorities (KeNHA, KURA, KeRRA) Kenya Pipeline Fiber Optic Networks such as KDN Local Authorities in charge of storm water drains The rail-line corridor contains properties which are likely to be sensitive to disruption due to construction such as schools, health facilities, parks & public open space, recreation & community facilities and footpaths & rights of way. Delays caused by construction traffic using local roads		Prior to excavation and blasting, identify locations of all infrastructure and services and provide measures to protect from impacts. Inform all service consumers, in sufficient lead time, of intended interruptions, of how long the interruptions are likely to be and for what reason. For services to be closed/interrupted for the duration of the project construction, the schedule of the construction work will be designed to keep the service interruptions at a minimum. During the scheduled service closures, RVWSB in consultation with affected service providers, to explore feasible alternative service delivery options Schedule the interruptions, to the extent possible, in a manner that different services can be provided in staggered fashion	RVWSB Design engineers, Supervising engineers, contractor	
CULTURAL HERITAGE		The culture and traditional occupations and economies of		As much as practical, hire labour locally	RVWSB	

		communities on the dam area is at risk Social problems brought by immigrant population		Social education to promote peaceful co-existence Ensure community participation in decisions regarding heritage conservation, and realize that the cultural and spiritual importance of heritage sites and properties may be very location-specific	Design engineers, Supervising engineers, contractor	
EHS		Creation of stagnant water bodies in borrow pits and quarries which act as habitats for disease vectors Increased risks of drowning accidents Increased risk of vector-borne diseases Risk of dam failure Increased seismicity risk Noise pollution from operating plant and machinery HIV & AIDS		Ensure alcohol free work force Draft operational policies on safety e.g. Alcohol use, speed limits Keep verifiable records of all accidents and incidences Spread awareness to curb vandalism of safety equipment and other installations Draft and operational manuals in line with OSHA for approval by RVWSB Posting of clear and prominent warning signage at appropriate potential points of entry to hazardous areas Installation of barriers like fences around reservoir ands and other locations to prevent access to facilities by unauthorized persons Local education especially to young people and school children regarding the dangers of trespassing, HIV/AIDS awareness campaigns and provision of condoms	RVWSB Design engineers, Supervising engineers, contractor	

DAM		Direct land-take Habitat fragmentation Staff-wildlife conflicts Breeding grounds for disease vectors Soil erosion and loss of rich sediment		Land acquisition to be done through a detailed RAP before the contractor goes to site Contractor to Develop and implement an erosion and Sediment Control Plan Design engineer to include sediment traps to reduce rate of sedimentation of the dam Installation of barriers like fences around reservoir ands and other locations to prevent access to facilities by unauthorized persons and animals Avoid fragmentation of aquatic habitats by providing adequate structures to bridge the barriers erected;	RVWSB Design engineers, Supervising engineers, contractor	
ACCESS ROADS		Land-take Increased Traffic accidents Dust and emissions Gender inequalities in imparting skills		Land acquisition to be done through a detailed RAP before the contractor goes to site Promote technical training in construction works to men and women alike. use of personal protective equipment (PPE) Proper signage and erecting speed control structures on the improved roads	RVWSB Design engineers, Supervising engineers, contractor	
POWER GENERATION		Occupational hazards Oils spills from mechanical equipment fire hazards during operation phase		Only workers who are specifically trained and competent in working with electrical systems should be allowed to approach these systems. Fuelling facilities should develop a formal spill prevention and control plan that	RVWSB Design engineers,	

		Waste oils pollution		addresses significant scenarios and magnitudes of releases. The plan should be supported by the necessary resources and training. Spill response equipment should be conveniently available to address all types of spills, including small spills	Supervising engineers, contractor	
WATER TREATMENT PLANT		Risk of polluting river waters using chemicals and backwash water Clearance of vegetation Risk of unpleasant taste of water due to oils from power generating set Fuel spills and land contamination at the treatment works site		Biological treatment or other polishing facilities to ensure all effluent meets regulatory discharge criteria Used oils should be containerized and transported to an approved local agent for safe disposal or transported with other scrap equipment to an approved facility elsewhere. Ensure all possible measures are taken to avoid presence of oils and greases in drinking water including pre-treatment if necessary	RVWSB Design engineers, Supervising engineers, contractor	
WATER TRANSMISSION PIPELINES		Direct Land take Visual Intrusion Disruption of services Risk of pipe bursts Construction wastes		Land acquisition to be done through a detailed RAP before the contractor goes to site The magnitude and nature of visual Impact is mainly subjective to views from various receptors. Inform all service consumers, in sufficient lead time, of intended interruptions, of how long the interruptions are likely to be and for what reason. The pipeline will need replacement after serving its useful life.	RVWSB Design engineers, Supervising engineers, contractor	

TUNNEL		Production of respirable dust Settlement or failure of tunnel support leading to the formation of a surface crater, damaged buildings, utilities & change of surface hydrology Removal of spoil materials may lead to odor impacts Potential loss of groundwater Localized lowering of the water table Suspended solids in effluents generated from dewatering Process water that requires treatment. Sewage generated by the construction workforce, Oily runoff from vehicles and storage areas Construction waste generation Contaminated soil from container storage or vehicle repair sites Visual impacts Loss /alteration of habitat	Irreversible Significant Long term	RVWSB to set overall EHS strategy for the tunnel project Encourage early contractor involvement Contractor to train workforce on in Tunnelling EHS Use of Personal Protective Equipment (PPE) by workers and all visitors to the site Use equipment fitted with water suppression to minimize the amount of dust Locate noisy machinery away from sensitive receivers; use silencers, mufflers and acoustic shields on plant Fully covered TBM launching shaft if necessary Installation of appropriate drainage facilities to control site runoff, (silt and oil traps) Biological treatment or other polishing facilities to ensure sewage effluent meets regulatory discharge criteria Adoption of good housekeeping practices, sorting and segregation of wastes for reuse and disposal Upon the completion of construction, reinstatement of visually amenable	RVWSB Design engineers, Supervising engineers, contractor	

		Construction and operational noise on sensitive receivers Possible fire tragedies		features and re-vegetation will be implemented Have ready fire detection and fire fighting facilities Design alternative escape route for tunnel workers Specify minimum standards for firefighting requirements, ventilation and adequate tunnel working space(s) Tunnel system design to ensure adequate ventilation		
RESERVOIRS	Construction & operation	Vegetation loss Noise from construction equipment Visual intrusion from large structures Spilling hazards Vandalism	Irreversible Long term,	Clearly identify the extent of areas to be cleared and those that must not be cleared or damaged on construction plans and in the field Restore ground around the reservoirs to original conditions Put structures to direct any spilling water to appropriate channels Inspect and repair all enclosure fences	RVWSB Contractor	3,000,000
Total Costs						

17 ENVIRONMENTAL MONITORING AND AUDIT PROGRAMME (EMAP)

17.1 The Environmental Monitoring and Audit Programme (EMAP)

A comprehensive Environmental Monitoring and Audit Programme (EMAP) will be implemented to check effectiveness of the mitigation measures as proposed and environmental compliance with relevant statutory requirements.

The proposed key EMAP requirements include:-

- ✓ Noise monitoring at designated monitoring stations during construction phase
- ✓ Dust monitoring at designated monitoring stations during construction phase
- ✓ Water quality monitoring during the course of construction works at river crossings to monitor any variation in water quality from the baseline conditions and identify any exceedance of Water Quality Objectives at sensitive receivers
- ✓ Regular site inspections at the works areas as part of the EMAP procedures to ensure the recommended mitigation measures are properly implemented.

The proponent through periodical audits will know how to monitor the project affected community during implementation and operations phase.

17.2 Monitoring for Noise

Monitoring is a continuous undertaking to be done during construction and operation phases. Actions to be taken will include;

- ✓ Monitor if noise levels at sensitive receptors during day and night comply to those stipulated in the First & Second Schedules;
- ✓ Respond to any complaints arising in relation to noise.
- ✓ Conducting regular site audits to ensure that noise control measures are properly implemented.

17.3 Monitoring for Air Quality

Emissions and air quality monitoring programs provide information that can be used to assess the effectiveness of emissions management strategies. The air quality monitoring program will consider the following elements:-

- ✓ Monitoring parameters: - The monitoring parameters selected should reflect the pollutants of concern associated with project processes.
- ✓ Baseline calculations: Before the project commences, baseline air quality monitoring at and in the vicinity of the alignment and key component sites should be undertaken to assess background levels of key pollutants, in order to differentiate between existing ambient conditions and project-related impacts.

- ✓ Monitoring type and frequency: - Data on emissions and ambient air quality generated through the monitoring program should be representative of the emissions discharged by the project over time.
- ✓ Monitoring locations: - Ambient air quality monitoring may consist of off-site or fence line monitoring either by the project sponsor, the competent government agency, or by collaboration between both.
- ✓ Sampling and analysis methods: - Monitoring programs should apply national or international methods for sample collection and analysis, such as those published by the International Organization for Standardization.

17.4 Monitoring on Water Resources Management and Water Quality

For the purposes of managing project impacts, the water quality objectives include protection of dissolved oxygen levels in the waters, the turbidity and pH levels among other parameters. These parameters will be monitored on a regular basis.

Compliance with the regulations providing for integrated water resources management will be monitored through the respective agencies.

17.5 Monitoring on Waste Generation impacts

The following monitoring procedures are proposed for the construction and operation phases of the Project:

- ✓ Inspect waste storage areas on a weekly basis to make sure that wastes are being stored properly
- ✓ Maintain a waste register for all hazardous wastes and operation wastes. Review register monthly to identify any dramatic changes in waste generation patterns and possible opportunities for waste minimization.

17.6 Monitoring for the Terrestrial Ecology Impacts

Implement regular monitoring of:

- ✓ Pest species and weeds;
- ✓ Fauna strike and mortality during construction and operation and

For areas of the site that are to be rehabilitated, a photographic record will be prepared by the contractor prior to construction commencing.

This will be used as a baseline against which to measure the success of rehabilitation; conduct monthly audits of the proposed management plans for the construction period and recommend adaptive management for weed invasions in habitats adjacent to the project corridor; and on completion of the construction works, monthly visual inspections of the rehabilitated areas will be carried out for a period of 12 months.

17.7 Monitoring of for Land Management Impacts

- ✓ Have an institutional set-up or outsource monitoring of the implementation of the RAP.

- ✓ Check that design requirements have been met
- ✓ Monitor rehabilitation success through weekly inspections in the first four weeks after seeding, and then monthly until 80% cover has been achieved; Inspect fuel storage areas weekly and clean up and repair any ineffective storage areas.

17.8 Monitoring for Services Delivery Impacts

Service agreements entered into with the respective bodies should set up performance criteria and follow it up.

17.9 Monitoring for Environmental, Health and Safety Impacts

Ensure proper adherence by the operator to the O&M manual.

Regularly conduct;

- ✓ Fire safety audits
- ✓ Annual environmental audits

17.10 Monitoring/Performance Criteria at the Dam and Reservoir

The development of O&M manual with clearly spelt out standard operating procedures will ensure consistent maintenance practices by the operator despite staff turnover or even subcontracted operations. Monitoring will apply to both administrative and technical practices in dam operations.

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19 ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
CO	Carbon Monoxide
CoI	Corridor of Influence
CR	Critically Endangered
D&B	Drill & Blast
dB	Decibels
EASSy	Eastern Africa Submarine Cable System
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EM&AP	Environmental Monitoring and Audit Programme
EMCA	Environmental Management and Coordination Act
EMMP	Environmental Mitigation & Management Plan
EMP	Environmental Monitoring Plan
EN	Endangered
EW	Extinct in the wild
EX	Extinct
FGD	Focus Group Discussions
GHG	Greenhouse Gases
GPS	Global Positioning System
GSM	Global Satellite for Mobile
HHS	Household Surveys
HIV	Human-Immuno Deficiency
HMP	Health Management Plan
HSMP	Health and Safety Management Plan
IBA	Important Bird Areas
ICT	Information Computer Technology
ISPs	Internet Service Providers

IUCN	Union for Conservation of Nature
KDN	Kenya Data Networks
KEBS	Kenya Bureau of Standards
KeNHA	Kenya National Highways Authority
KeRRA	Kenya Rural Roads Authority
KII	Key Informant Interviews
KM	Kilometers
KP	Kenya Power
KPC	Kenya Pipeline Company Limited
KRC	Kenya Railways Corporation
KURA	Kenya Urban Roads Authority
LC	Least Concern
LVNWSB	Lake Victoria North Water Service Board
MW	Megawatts
NEMA	National Environment Management Authority
NOx	Nitrogen Oxides
NT	Near Threatened
OHE	Overhead Equipment
OSHA	Occupational Health and Safety Act
PCB	Polychlorinated Biphenyls
PM	Particulate Matter
PME	Powered Mechanical Equipment
PPE	Personal Protective Equipment
PTC	Positive Train Control
RoW	Right of Way
RPE	Respiratory Protective Equipment
RVWSB	Rift Valley Water Service Board
SHE	Safety, Health and Environment

SoE	State of the Environment
TBM	Tunnel Boring Machine
TEAMS	The East Africa Marine Systems
TES	Temporary Explosives Storage
THC	Total Hydrocarbons
ToR	Terms of Reference
UPS	Uninterruptible Power Supply
US‘	United States
VU	Vulnerable

0 APPENDICES

0.1 PUBLIC PARTICIPATION MEETINGS

ITARE DAM WATER SUPPLY PROJECT

MINUTES FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) & RESETTLEMENT ACTION PLAN (RAP) PUBLIC PARTICIPATION MEETING AT MERERONI WATER TREATEMENT PLANT MILIMANI ON 11/11/2015.

Present

Joel Atuti- Chief Milimani

Eng. Henry Cheruiyot- Rift Valley Water Service Board

Eng. Dr. Zablon Oonge – Consultant

Eng. Mark Gwena – Consultant

Hesbon Okari – Consultant

Project stakeholders

1. Preamble

The meeting started at 11:30 A.M. with the Chief Joel Atuti of Milimani location asking Mrs. Rakwach to pray. Then the people present introduced themselves. The Chief then gave social workers from Child Welfare Society and Child Protection Unit an opportunity to share information with the public regarding child welfare.

Eng. Henry Cheruiyot of RVWSB and the project manager introduced the project briefly. He mentioned the roles of NAWASSCO as the service provider, RVWSB the infrastructure developer and the consultant as assisting the board to design the projects. He also noted that Nakuru's growing population needs more water. The current production of 40,000 m3/day was not sufficient to meet the current demand. He then asked the consultant, Dr. Oonge to proceed with the presentation.

2. Presentation by Eng. Dr. Oonge

The Consultant began by introducing his team that included Eng. Mark Gwena and Hesbon Okari. He began the presentation with the purposes of public participation. The main objective being to inform the public about the project and make them own the project. He dwelt on the project details and explained the works beginning with the source works where there will be a 57 m high Asphalt core rockfill dam. The position of the dam is downstream of the confluence of Sundu, Songol and Ndoinet rivers. The dam will have a mini-hydropower plant producing about 300kW for consumption by project facilities. Then a 1.8 km long 1.2m diameter raw water mains running to a water treatment works with a capacity of treating 105,000 m^3/day. The treatment works facility will also include housing for staff. He emphasized that the source works are located within Nakuru County and that the border with Kericho County is further downstream in the forest where the transmission mains passes

through. The pipeline runs for 113 km passing through the forest, then emerges at Chepsir and follows the B1 road through Chepseon up to Kedowa then diverts into Londiani Forest where the 14.3km long and 3.6 m diameter tunnel starts. The tunnel comes out at Sachang'wan and follows the A104 road up to Ngata area of Nakuru. In Ngata there are 2No. tanks of 5,000 m3 each. The other tank sites are Prisons, Kelelwet Secondary and KBC Menengai which have 1No. tank each. There will be Tees provided along the pipeline route for supply to Chepsir, Chepseon, Kedowa, Molo, Sachangwan, Elburgon, Njoro, Salgaa townships.

The consultant highlighted the relevant Kenyan laws that make it mandatory to conduct ESIA and RAP as well as the World banks Operational policies. He noted that the financier of the project was satisfied with the use of WB OPs relevant to the project and hence the report was satisfactory for their purpose.

He gave a summary of baseline findings about literacy, population, topography and economic activity in the project area. He also explained the anticipated impacts for planning phase, construction phase, operations phase and at decommissioning of the project. He was quick to add that this project might not be decommissioned. In the planning phase, he emphasized land-take by the project as a major impact whose mitigation was fair compensation to the Project affected Persons (PAPs). The positive impacts during construction included jobs, skills acquisition and interaction with people from different cultures. He said the contractor is advised to source for unskilled labour within the project area but was free to bring his skilled workforce. The negative impacts during construction were identified as water, dust and air pollution arising from operation of machinery and excavation of soils. The mitigation suggested included sprinkling water during dry season and having roadworthy equipment. He also explained the process used to draw up the list of people eligible for compensation and that the exercise will be done by RVWSB jointly with the national Land commission. The affected persons will be paid well in advance before their property is interfered with.

The end of the presentation gave way to the question and answer session.

3. <u>Remarks, questions and answers</u>

The Consultant invited the participants to ask their questions as well as provide observations for inclusion in the report. The questions asked are follows;

1. Benjamin Birgen asked if the dam will generate hydropower.

   Answer: Dr. Oonge replied yes and stated that it will produce 300kW of power.

2. Samuel Kanyoro asked who will finance the project and whether there can be assurance that the project will take 4 years. He also wondered how there could be wastage of water in the initial years.

Answer: Dr. Oonge replied that the financier is the Italian government together with the government of Kenya. He also stated that if the residents desist from political machinations against the project, it can take 4 years. He also explained that the excess water in the initial years will be as a result of the designed supply being a future demand that incorporates population growth until the ultimate year.

3. Chief Joel Atuti of Milimani asked if this project might fail to start as had been the case with other recent projects in the area and also wanted to know if there will be any Corporate Social Responsibility component in this project.

Answer: Dr. Oonge replied that since the financing had been secured, the only stage remaining was the NEMA license which would follow as soon as the stakeholders give the green light during the public hearings. He also said that projects fail to take off for different reasons, some of which are out of the control of the consultant or proponent.

Assisting answers: Eng. Henry Cheruiyot confirmed that there will be some power generation both at the dam and at the tanks. The power will be for the project's consumption aimed at reducing reliance on expensive grid power. He also said that there will be no upward adjustment of water tariffs in order for the project to be considered feasible. Moreover, he stated that Itare dam was found to be the best option among many projects studied to supply water to Nakuru.

4. John Kibicho- Chairman Milimani Residents Association wanted to know the plans for wastewater disposal now that a lot of water is coming to Lake Nakuru basin. He also wanted to know if the satellite towns will get any water.

Answer: Dr. Oonge observed that waste water disposal will be needed to deal with the inflows from this project. He further noted that wastewater will comprise 85% of the clean water coming into the town. He however left the project manager to tell if the board has any plans about the matter.

5. Linet Izima (Nakuru Businesses Association) wanted to know if the project will lower cost of water given that it does not rely on pumping and generates some power of its own.

Answer: The project water will be sold at existing tariffs.

Assisting answers: Mr. Omedo, the operations manager at the NAWASSCO water treatment plant appreciated the project. He added that power accounted for 30% of total costs of delivering clean water to Nakuru town. He also observed that fresh river water would incur less treatment costs unlike the borehole water that contains high mineral content.

Assisting answers: Eng. Henry rose to answer about CSR for which he stated that Nakuru area are net beneficiaries in this project and as such all the CSR for this project is meant to benefit the people at the dam area. He added that there were ongoing studies regarding sewage disposal for Nakuru since they cannot dispose any more water into the Lake because it will destroy its fragile ecosystem. He explained that of the 105,000 m^3/day about 30,000 m^3/day will be for the satellite towns along the route and 70,000 m^3/day will get to Nakuru.

6. Benjamin Birgen asked if sewage reticulation will be improved to cover the entire town.

Answer: Eng. Henry replied that there is an existing reticulation that can be relied on and that in some areas the uptake of sewer connections was low despite having a line close by.

7. Matindi wondered why the source had to be very far.

Answer: Eng. Henry replied that Nakuru has no water source for itself that can provide sufficient water. The Malewa River cannot support abstraction for environmental reasons. The Itare dam water supply project was thus found to be the most feasible for Nakuru water supply.

4. Conclusion

Eng. Dr. Oonge asked the participants in support of the project to raise their hands. They unanimously supported the project.

5. AOB

There being no other business, the question and answer session ended. It was followed by a vote of thanks from Mr. Omedo and then a prayer led by Mrs. Rakwach.

The area chief making introductory remarks

Eng. Dr. Oonge explaining the project

A participant asking a question

The participants showing their support for the project

MINUTES FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) & RESETTLEMENT ACTION PLAN (RAP) PUBLIC PARTICIPATION MEETING AT KELELWET SECONDARY SCHOOL ON 11-11-2015.

Present

Abdalla –Chief Kapkures

Gladys Bett- Assistant Chief

Lucy Kipkorir –Assistant Chief

Philemon Cheruiyot- Ward administrator

Eng. Henry Cheruiyot- Rift Valley Water Service Board

Eng. Dr. Zablon Oonge – Consultant

Eng. Mark Gwena – Consultant

Hesbon Okari – Consultant

Project stakeholders

1. Preamble

The chief introduced the consultants and noted that the area needs fresh clean water to reduce their dependence on borehole water. He then called on the people to introduce themselves as well. After everyone had spoken, the chief asked the Consultant to introduce his team and then proceed with the presentation.

2. Presentation by Eng. Dr. Oonge Zablon

The Consultant began by introducing his team that included Eng. Mark Gwena and Hesbon Okari. He began the presentation with the purposes of public participation. The main objective being to inform the public about the project and make them own the project. He dwelt on the project details and explained the works beginning with the source works where there will be a 57 m high Asphalt core rockfill dam. The position of the dam is downstream of the confluence of Sundu, Songol and Ndoinet rivers. The dam will have a mini-hydropower plant producing about 300kW for consumption by project facilities. Then a 1.8 km long 1.2m diameter raw water mains running to a water treatment works with a capacity of treating 105,000 m3/day. The treatment works facility will also include housing for staff. He emphasized that the source works are located within Nakuru County and that the border with Kericho County is further downstream in the forest where the transmission mains passes through. The pipeline runs for 113 km passing through the forest, then emerges at Chepsir and follows the B1 road through Chepseon up to Kedowa then diverts into Londiani Forest where the 14.3km long and 3.6 m diameter tunnel starts. The tunnel comes out at Sachang'wan and follows the A104 road up to Ngata area of Nakuru. In Ngata there are 2No. tanks of 5,000 m3 each. The other tank sites are Prisons, Kelelwet Secondary and KBC Menengai which have 1No. tank each. There will be Tees provided along the pipeline route for supply to Chepsir, Chepseon, Kedowa, Molo, Sachangwan, Elburgon, Njoro, Salgaa townships.

The consultant highlighted the relevant Kenyan laws that make it mandatory to conduct ESIA and RAP as well as the World banks Operational policies. He noted that the financier of the project was satisfied with the use of WB OPs relevant to the project and hence the report was satisfactory for their purpose. He gave a summary of baseline findings about literacy, population, topography and economic activity in the project area. He also explained the anticipated impacts for planning phase, construction phase, operations phase and at decommissioning of the project. He was quick to add that this project might not be decommissioned. In the planning phase, he emphasized land-take by the project as a major impact whose mitigation was fair compensation to the Project affected Persons (PAPs). The positive impacts during construction included jobs, skills acquisition and interaction with people from different cultures. He said the contractor is advised to source for unskilled labour within the project area but was free to bring his skilled workforce. The negative impacts during construction were identified as water, dust and air pollution arising from operation of machinery and excavation of soils. The mitigation suggested included sprinkling water during dry season and having roadworthy equipment.

3. Remarks, questions and answers

The Consultant suggested that the people ask five questions in a row before he could stand to answer.

Q1. Samuel Ng'eno from Barut Area asked if there will be compensation for the land on which Kelelwet tanks will be built.

Q2. Samuel Soi of Kigonor wanted to know where the distribution will cover from the Kelelwet tanks.

Q3. Evans Kering of Lalwet wanted to know if skilled labourers from the area stood a chance of getting employment.

Q4. Joseph Korir of Kigonor if water from the Kelelwet tanks will be distributed to community tanks in the area.

Q5. Daniel Ngili asked of backfilling of trenches can be done manually so that jobs can be created.

Answers

The Consultant advised that the method of backfilling will be the contractor's choice and backfilling will be done as a last activity after testing the pipe.

As for the land where the tanks will be situated, the government cannot pay itself for its own land. Compensation is for private land.

The contractor cannot be forced to absorb skilled labour from the project area. It can only be a request that priority be given to such applicants.

Assisting answers from Eng. Henry: He said water distribution will cover all residents around the tank irrespective of whether they will be subscribed to any other community projects.

Q.6 David Lang'at of Lalwet asked who will be paid compensation in case land has been subdivided among sons of the original holder of the title.

Q7. Stanley Ng'eno asked if compensation will be paid after or before works commence.

Q8. Johnson Sigei of Lalwet asked of the water will be given free of charge.

Q9. Kosgey Moses wanted to know if the water source is in Nakuru County.

Q10. Thomas Kibet wanted to know if building plans will be needed in valuation of permanent structures.

Answers

The consultant said that in cases where land has been subdivided among heirs or buyers, the buyers will get their entitlement based on the mutation form which will show the original and new sizes of that parcel of land. It also envisaged that compensation be paid before the contractor reaches one's property. However, they were advised to be considerate in cases where government bureaucracy reduces the amount of time afforded them as notice before demolition.

The consultant also advised that building plans will not be necessary as details of the house captured in the report will be sufficient to assist in valuation of property. That market rates of permanent structures are well known.

He also said that water will not be given free of charge as there will be need to maintain the project using funds it generates by itself.

Assisting answer Eng. Henry: he said that the reason water will not be free is because there is a lot of capital injection involved in the planning and construction stage that needed to be recouped. He however suggested that the tariffs applicable will be friendly and will not exceed existing market rates.

Q11. Samson Chuma from Mogon wanted to know if distribution will be part of the project.

Q12. Joseph Tobon of Lalwet wanted to know if the new pipeline will affect existing ones laid by community projects. He also suggested that the contractor be requested to buy local materials and asked for community projects for CSR.

Q13. David Rotich of Ingobor wanted to know if the project will be managed similar to the way they manage community water projects using committees.

Q14. Eric Langat wanted to know the way the project will deal with graves found along its route.

Answers

The Consultant suggested that where graves are found to be within the pipeline corridor, the family will be compensated appropriately and facilitated moneywise so as to move the grave in a manner befitting the customs of the community.

As for management of the project, he said that it would be handed over to NAWASSCO since they have proper experience in water provision to large populations.

The request to have the contractor buy construction materials from the locals was accepted and the consultant noted that it would be beneficial even to the contractor as haulage distances would be reduced greatly.

As for CSR, the Consultant said that it would be unfair to use funds from a water project to subsidize the health ministry by building a dispensary. He suggested the people use their elected leaders to have their county government build facilities for them.

Assisting Answers: Eng. Henry said that the project doesn't include reticulation. That would be a separate project and added that for a start the board would consider using existing pipelines if they

are found suitable after testing. He also clarified that the CSR envisaged in this project would be done at the source works (dam area). The people of Nakuru are beneficiaries of the project who should instead hope that those at the source can accept the project. He also mainteained that NAWASSCO would have the proper capacity to maintain and operate the project.

Q15. Johana Rotich - Kelelwet said he cannot afford to buy distribution pipes and wanted to know how he could get the water.

Q16. Jacob Ruto wanted to know measures taken to counter political interference on the project.

Q17. Charles Too requested that even skilled labor found within the project area be given priority.

Q18. Pastor Lawrence Kisoi wondered if the new water will be sold at rates lower than those of community borehole projects.

Q19. Samson Koskei approved the project.

Q20. Moses Koskei also supported the project.

Q21. Joseph Sigei requested for a dispensary built by the project.

Answers

The consultant said that political interference is hard to deal with since most politicians have the backing of the people. He thus put it to them that success of the project lay in the hands of the people if they owned the project and let it proceed. He thanked those who had chosen to support the project. He also said that where distribution to every household is not possible, the service providers usually opt for communal water vending points locally known as 'water kiosks'.

Eng Henry rose to answer Pastor Lawrence's query about competition with local projects. He said that those projects will not be destroyed as they can assist the community in other uses if need be. As the competition, he noted that it can be a healthy thing that can improve the management of community water projects.

4. Conclusion

The consultant the posed the question that those in support of the project show it by raising their hands. The response was 100% in favour of the project.

The meeting ended with a word of prayer after some announcements from the area chief and village elder.

The participants keenly follow the proceedings.

Eng. Dr. Oonge stresses a point during his presentation.

The project manager, Eng. Henry, answers the questions.

The participants show their support for the project

MINUTES FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) & RESETTLEMENT ACTION PLAN (RAP) PUBLIC PARTICIPATION MEETING AT RVWSB YARD ON 12-11-2015

Present

Joseph Mburu- Assistant Chief

Joel Atuti- Chief Milimani

Eng. Henry Cheruiyot- Rift Valley Water Service Board
Eng. Dr. Zablon Oonge – Consultant
Eng. Mark Gwena – Consultant
Hesbon Okari – Consultant
Project stakeholders

1. Preamble

Then the meeting started at 11:00 A.M. when the Assistant chief Mburu of London area asked Mr. Kaiyama to lead the people in a word of prayer. Then some of the elders present were given a chance to greet the people. The elder for Viwandani and the chief Viwandani rose to greet the people.

Thereafter the officer from Nakuru Prisons was also given time to speak. He said that the prison houses over 6000 people and the available water is not sufficient, forcing them to apply rationing. However, it greatly affects the sanitation of the institution. They have plans to install a biogas energy facility to make use of human waste as a means of improving waste disposal in the prison. He concluded by supporting this project as it would ensure the prisoners and the wardens live with dignity.

The chief also recognized the presence of the ward administrator and then asked the MD NAWASSCO to say a word. The MD NAWASSCO Eng. James Ng'ang'a said that Nakuru town has a water demand of 70,00m^3/day yet the available water is only 30,000m^3/day. He also disclosed that the cost of power in the existing supply system was expensive. He expressed optimism that this project will turn the tide if implemented.

The area Member of County Assembly also rose to express his dissatisfaction with water service delivery in the area. He, as a consequence, strongly supported this project with the hope that it will bring to a close the water shortages the residents have endured for a long time.

The Chief asked Eng. Henry to introduce the consultant who in turn introduced his team and then began his presentation.

2. Presentation by Eng. Dr. Zablon Oonge

The Consultant began by introducing his team that included Eng. Mark Gwena and Hesbon Okari. He began the presentation with the purposes of public participation. The main objective being to inform the public about the project and make them own the project. He dwelt on the project details and explained the works beginning with the source works where there will be a 57 m high Asphalt core rockfill dam. The position of the dam is downstream of the confluence of Sundu, Songol and Ndoinet rivers. The dam will have a mini-hydropower plant producing about 300kW for consumption by project facilities. Then a 1.8 km long 1.2m diameter raw water mains running to a water treatment works with a capacity of treating 105,000 m3/day. The treatment works facility will also include housing for staff. He emphasized that the source works are located within Nakuru County and that the border with Kericho County is further downstream in the forest where the transmission mains passes through. The pipeline runs for 113 km passing through the forest, then emerges at Chepsir and follows the B1 road

through Chepseon up to Kedowa then diverts into Londiani Forest where the 14.3km long and 3.6 m diameter tunnel starts. The tunnel comes out at Sachang'wan and follows the A104 road up to Ngata area of Nakuru. In Ngata there are 2No. tanks of 5,000 m3 each. The other tank sites are Prisons, Kelelwet Secondary and KBC Menengai which have 1No. tank each. There will be Tees provided along the pipeline route for supply to Chepsir, Chepseon, Kedowa, Molo, Sachang'wan, Elburgon, Njoro, Salgaa townships.

The consultant highlighted the relevant Kenyan laws that make it mandatory to conduct ESIA and RAP as well as the World banks Operational policies. He noted that the financier of the project was satisfied with the use of WB OPs relevant to the project and hence the report was satisfactory for their purpose. He gave a summary of baseline findings about literacy, population, topography and economic activity in the project area. He also explained the anticipated impacts for planning phase, construction phase, operations phase and at decommissioning of the project. He was quick to add that this project might not be decommissioned. In the planning phase, he emphasized land-take by the project as a major impact whose mitigation was fair compensation to the Project affected Persons (PAPs). The positive impacts during construction included jobs, skills acquisition and interaction with people from different cultures. He said the contractor is advised to source for unskilled labour within the project area but was free to bring his skilled workforce. The negative impacts during construction were identified as water, dust and air pollution arising from operation of machinery and excavation of soils. The mitigation suggested included sprinkling water during dry season and having roadworthy equipment.

3. Remarks, Questions and Answers

The Consultant suggested that the people ask five questions in a row before he could stand to answer.

Q1.Keziah Ndaba –London, asked if the project considered future population of the town in planning to ensure at completion there will be no water rationing.

Q2. Peter Kairu- London said that he had been on the committee that planned the route for the pipeline and he noted that the new alignment was different. He also requested that the labourers be well paid. He was against the construction of the tank at prisons compound because he felt the wardens might close the valves and deny the community water as had happened previously with a tank the community put up in the prisons compound. He also wondered if the contract could be split up so as to hasten the construction.

Q3. Jason Omwaka wondered how they were going to deal with Kericho residents who might raise political issues.

Q4. Morris Olago of London area endorsed the project.

Q5. Gladys Kamurei asked if there are plans to do CSR for the community at the source. She also wanted the contractor to hire skilled labourers from the project area.

Answers

The Consultant replied that the design has 40 year horizon and that the population at ultimate demand was considered. In response to Kairu's query about pay, he said that the contractor quoted for the

project using gazetted wages rates and as such cannot pay more. He also advised that just like any businessman would only entrust people he is sure about their skills, the contractor for this project will be free to source skilled labour from anywhere, provided he is satisfied that they will take good care of his machinery. He also noted that the water that will be flowing to the prison tank will be sufficient to serve the community and the prison and hence there will never be a need to close the valve or lock the community out of using it. He also said the contractor is at liberty to subcontract some of the works but cannot be compelled to do so.

About the pipeline route, he observed that the final alignment was selected for its own merits such as avoiding pumping and as such any other routes considered before were simply alternatives for consideration. He also dismissed the idea that the water source is within Kericho County. He also said that the pipeline will have Tees along the route to supply townships even those in Kericho County as a way of buying their support for the project.

Assisting answer: Eng. Henry rose to answer that there will be community projects at the dam area such as classrooms, dispensary and water supply project for them.

Assisting answer: The Prison warden rose to dispel any fears about having the tank in their compound. He said that the earlier tank referred to by one member did not have sufficient water to supply. He denied that the Prison authorities had ever closed the community supply pipe.

Q6. Joseph Nyakundi-Bangladesh asked if there will be distribution as part of the current project.

Q7. Koech wanted NAWASSCO to reopen water kiosks that had served the community well before they were closed.

Q8. Joseph King'ori asked if the project had a component of catchment conservation.

Q9. Allan Wambui-Bangladesh supported the project and was ready to pay for the water especially if it will not be rationed. He said constant supply would improve sanitation a great deal. He also asked if the project would benefit far-flung suburbs of Nakuru such as Gilgil.

Q10. Magdalene asked how much time will be afforded the Project affected persons before their property is destroyed to pave way for the pipeline.

Answers

The consultant answered that PAPs are usually afforded a 6 month notice period unless government bureaucracy hinders the compensation process. The consultant clarified that reticulation was not part of the current contract but urged the people to count this project as a first step toward getting reliable water for Nakuru. He advised that a project to improve reticulation can be organized as a separate contract that can be done even before this project is completed. Regarding catchment conservation, the consultant noted that there are statutory bodies that are mandated to do so but also the client was in contact with Kenya Forest Services with a view to restoring or replacing any forest cover that will be destroyed during construction of the pipeline. He also said that even though settlements had been approved in the Mau, the settlers also plant trees. He also noted that this project was likely to relieve

the other sources currently supplying Nakuru town so that they can be used to supply the far-flung suburbs of Nakuru.

Assisting answers

Eng. Henry from RVWSB informed the audience that the Board would use the existing reticulation network if funds for a new project are not secured in good time. He informed them that the existing reticulation infrastructure is good enough if complemented with a few new lines. He explained that this project is meant to serve about 800,000 residents of Nakuru County which included people in outskirts of Nakuru town. He concurred with the consultant that water from Olobanita will not need to flow into town and would thus serve people in Gilgil area.

The MD NAWASSCO rose to respond to the request to have water kiosks reopened. He said the reason some kiosks were closed is that they had accumulated unpaid bills. He then suggested that the community organize themselves and present a payment plan for the overdue monies after which the connections can be reinstated. He announced that as a service provider, they were exploring use of prepaid tokens for water in the low income areas so as to cut out the vendors who sell the commodity with very high margins. Prepaid tokens would also solve the problem of pending bills.

Q11. Joseph Nyakundi reported that the residents in the low income areas still use pit latrines and these were making the area inhabitable. He thus wanted a sewer line for them.

Q12. Joachim Santiago asked who will be managing the project in the operation phase.

Q13. Simon Maina wanted pumps installed to supply them water in their area which did not have water at that time.

Answers

The request to have pumps installed was noted by the MD NAWASSCO. The consultant said the project would be operated by NAWASSCO and NARUWASCO. Mr. Nyakundi was requested to wait for the studies on sewerage handling for Nakuru town to be complete.

4. Conclusion

Eng. Dr. Oonge asked the participants in support of the project to raise their hands. They unanimously supported the project. The meeting was wound up with a prayer.

Eng. Dr. Oonge stresses a point during his presentation.

Participants following the presentation keenly

A stakeholder asks a question

The participants show their support for the project

MINUTES FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) & RESETTLEMENT ACTION PLAN (RAP) PUBLIC PARTICIPATION MEETING AT KIROBON TANKS/TULWET

Present

David Koech – Chief

Eng. Henry Cheruiyot –Project manager RVWSB

Eng. Dr. Zablon Oonge- Consultant

Eng. Mark Gwena – Consultant

Hesbon Okari- Consultant

Project stakeholders

1. Preamble

The meeting began at 3:10 p.m. amid drizzles. The Chief opened the meeting by asking Pastor Bosire to pray. He then asked the people to introduce themselves after which he gave Eng. Henry the opportunity to speak.

Eng. Henry described the project in summary and mentioned that the reason we were having a meeting at Kirobon was that the Main reservoir (10,000 m^3) had been proposed to be built there. He then let the consultant introduce his team and begin his presentation.

2. Presentation by Eng. Dr. Zablon Oonge

The Consultant began by introducing his team that included Eng. Mark Gwena and Hesbon Okari. He began the presentation with the purposes of public participation. The main objective being to inform the public about the project and make them own the project. He dwelt on the project details and explained the works beginning with the source works where there will be a 57 m high Asphalt core rockfill dam. The position of the dam is downstream of the confluence of Sundu, Songol and Ndoinet rivers. The dam will have a mini-hydropower plant producing about 300kW for consumption by project facilities. Then a 1.8 km long 1.2m diameter raw water mains running to a water treatment works with a capacity of treating 105,000 m3/day. The treatment works facility will also include housing for staff. He emphasized that the source works are located within Nakuru County and that the border with Kericho County is further downstream in the forest where the transmission mains passes through. The pipeline runs for 113 km passing through the forest, then emerges at Chepsir and follows the B1 road through Chepseon up to Kedowa then diverts into Londiani Forest where the 14.3km long and 3.6 m diameter tunnel starts. The tunnel comes out at Sachangwan and follows the A104 road up to Ngata area of Nakuru. In Ngata there are 2No. tanks of 5,000 m3 each. The other tank sites are Prisons, Kelelwet Secondary and KBC Menengai which have 1No. tank each. There will be Tees provided along the pipeline route for supply to Chepsir, Chepseon, Kedowa, Molo, Sachangwan, Elburgon, Njoro, Salgaa townships.

The consultant highlighted the relevant Kenyan laws that make it mandatory to conduct ESIA and RAP as well as the World banks Operational policies. He noted that the financier of the project was satisfied with the use of WB OPs relevant to the project and hence the report was satisfactory for their purpose. He gave a summary of baseline findings about literacy, population, topography and economic activity in the project area. He also explained the anticipated impacts for planning phase, construction phase, operations phase and at decommissioning of the project. He was quick to add that this project might not be decommissioned. In the planning phase, he emphasized land-take by the project as a major impact whose mitigation was fair compensation to the Project affected Persons (PAPs). The positive impacts during construction included jobs, skills acquisition and interaction with people from different

cultures. He said the contractor is advised to source for unskilled labour within the project area but was free to bring his skilled workforce. The negative impacts during construction were identified as water, dust and air pollution arising from operation of machinery and excavation of soils. The mitigation suggested included sprinkling water during dry season and having roadworthy equipment.

3. Remarks, Questions and Answers

Q1. Elijah Chelaite –Loret: first declared that he was in support of the project. He then asked what rates will be used in compensation and how they were arrived at. He also requested that the road reserve be marked in advance before the construction begins. He asked whether Kericho residents had been requested to let water flow into Nakuru County.

Q2. Raymond Cheruiyot asked how distribution will be done and which areas will be covered.

Q3. Pius thanked the owner of the land for donating it for the purposes of putting up a water tank to serve the community. He requested that the children of the owner be considered for employment.

Q4. William Koskei- Kiptenden wanted assurance that they will get water from this project unlike what happened to Chemususu dam project in which the residents at the source had refused any attempts to supply water to Nakuru. He supported the project.

Q5. Ambrose Ngare- Ngata: supported the project. He asked if a committee can be constituted to monitor project quality and progress and report to the people. He also questioned where water from the existing tanks went to because the residents were not getting any water from the service providers.

Answers

The consultant replied that engineering consultants are hired by the client to do quality assurance and no other committee will be necessary. He added that if the people wanted to find out more information about the project then they could use proper channels such as through their elected leaders. Regarding political interference from the Kericho side, the consultant advised that engineers might not have the solution but the people, through their leaders would be the best channel to solve such problems if they arise. But he added that thus far the people of Kericho County had been supportive of the project.

Pius' request would remain in the records for consideration by the contractor.

The project has Tees for towns along the pipeline route and even those off the route but within Nakuru County such as Molo, Elburgon and Njoro.

The consultant concurred that the road reserve be marked as the works start. He also said that since the works will proceed concurrently, the project would most likely take 4 years in the absence of interference.

He also clarified that the compensation will be paid pro rata, and that for each area and property different rates will apply as guided by government valuers and the National Lands Commission.

Q6. Ben Omwandho asked what project hindrances had been encountered already and how they were addressed. He also wanted to know how they can get status updates.

Q7. David Kirui asked if a Tee will be provided for Njoro area.

Q8. Dennis Ng'eno asked if the works will be done concurrently so as to hasten completion.

Q9. Evans Ongeri (Chief Kiamunyi) lamented that there had been no water in Kiamunyi for over 5 years and expressed hope that this project will supply their area too. He also asked if NARUWASCO could take action against people who had built houses on top of buried water pipes.

Q10. Hillary Kirui asked if undertaking such a big project required consent from Egypt since the river drains into Lake Victoria.

Answers

The consultant began by stating that the Nile Basin treaties do not prevent nations from developing their water resources for domestic consumption.

As regards progress updates, the people will get information through their elected leaders. In addition, meetings such as the public hearings should also count as informing the people so that they own the project.

The consultant said that Njoro town was also included in the water supply scheme.Those in Kiamunyi will be served by the Prisons Tank and those who build on buried pipes were cautioned that in case of pipe bursts, their property will be damaged.

The consultant explained that even after splitting the project and working concurrently, the duration to completion will remain 4 years because of the tunnel and dam which proceed rather slowly.

Q 11. Sarah wondered what would happen to the project if it dried up completely like had been seen in some lakes in the Rift Valley.

Q12. Elijah asked if distribution will be part of the project.

Q13. William Chumba (CDF representative) also enquired about reticulation.

Q14. David Koech asked how much land will be required for the tanks.

Q15. Chief Koech asked that the size of land needed be pegged/ marked well in advance to avoid encroachment.

Answers

The consultant clarified that reticulation will not be part of the current contract. He said that the tank dimesnions will be 50m by 25m by 4m for each tank thus 1 acre would be sufficient to accommodate two tanks with their ancillary facilities. He added that a severe drought can dry up the dam but eventually when it rains, it will revert to normal operations but was quick to add that the seasonal droughts will not lead to drying up of the dam.

Eng. Henry also informed them that the water will be sufficient for all areas and it will be affordable. He noted that since the land on which the tanks will be built was donated by the community for water tanks, no compensation will be necessary unless extra land be required. He told them that reticulation will be designed as a separate contract using different funds and that everyone will be covered under reticulation. He mentioned that the project had planned some CSR for the community at the source as a way of giving back.

Conclusion

The meeting ended at 5:30 p.m with a word of prayer from Pastor Bosire.

Eng. Dr. Oonge making his presentation

Eng. Henry, the project manager, explains a point to the participants

Eng. Henry, the project manager, responds to a question

The participants show their support for the project

MINUTES FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) & RESETTLEMENT ACTION PLAN (RAP) PUBLIC PARTICIPATION MEETING AT MEETING AT SACHANG'WAN CENTRE

Present

Angela Wanyama – Assistant County Commissioner
Eng. Henry Cheruiyot –Project manager RVWSB
Eng. Dr. Zablon Oonge- Consultant
Eng. Mark Gwena – Consultant
Hesbon Okari- Consultant
Project stakeholders

1. Preamble

The meeting began at 13:00 with a brief introduction from the Assistant County commissioner Angela Wanyama. Thereafter the consultant began his presentation.

2. Presentation by Eng. Dr. Zablon Oonge

The Consultant began by introducing his team that included Eng. Mark Gwena and Hesbon Okari. He began the presentation with the purposes of public participation. The main objective being to inform the public about the project and make them own the project. He dwelt on the project details and explained the works beginning with the source works where there will be a 57 m high Asphalt core rockfill dam. The position of the dam is downstream of the confluence of Sundu, Songol and Ndoinet rivers. The dam will have a mini-hydropower plant producing about 300kW for consumption by project facilities. Then a 1.8 km long 1.2m diameter raw water mains running to a water treatment works with a capacity of treating 105,000 m3/day. The treatment works facility will also include housing for staff. He emphasized that the source works are located within Nakuru County and that the border with Kericho County is further downstream in the forest where the transmission mains passes through. The pipeline runs for 113 km passing through the forest, then emerges at Chepsir and follows the B1 road through Chepseon up to Kedowa then diverts into Londiani Forest where the 14.3km long and 3.6 m diameter tunnel starts. The tunnel comes out at Sachangwan and follows the A104 road up to Ngata area of Nakuru. In Ngata there are 2No. tanks of 5,000 m3 each. The other tank sites are Prisons, Kelelwet Secondary and KBC Menengai which have 1No. tank each. There will be Tees provided along the pipeline route for supply to Chepsir, Chepseon, Kedowa, Molo, Sachangwan, Elburgon, Njoro, Salgaa townships.

The consultant highlighted the relevant Kenyan laws that make it mandatory to conduct ESIA and RAP as well as the World banks Operational policies. He noted that the financier of the project was satisfied with the use of WB OPs relevant to the project and hence the report was satisfactory for their purpose. He gave a summary of baseline findings about literacy, population, topography and economic activity in the project area. He also explained the anticipated impacts for planning phase, construction phase, operations phase and at decommissioning of the project. He was quick to add that this project might not be decommissioned. In the planning phase, he emphasized land-take by the project as a major

impact whose mitigation was fair compensation to the Project affected Persons (PAPs). The positive impacts during construction included jobs, skills acquisition and interaction with people from different cultures. He said the contractor is advised to source for unskilled labour within the project area but was free to bring his skilled workforce. The negative impacts during construction were identified as water, dust and air pollution arising from operation of machinery and excavation of soils. The mitigation suggested included sprinkling water during dry season and having roadworthy equipment.

3. Remarks, Questions and Answers

Q1. MCA Molo asked that besides putting Tees along the pipeline route, tanks should be considered as part of the project. He also wanted different tariffs for different areas because the purchasing power of the rural folk was not similar to town dwellers. He also asked about protection of groundwater during tunnel boring.

Q2. Sammy Sitienei asked if those who own the land above the tunnel will be compensated. He also asked if the tunnel will have a pipe inside. He asked if the tunneling will affect the landform above it.

Q3. Mageto- (Chief Sachang'wan) asked if people along the route will get water or even those living a distance off the pipeline.

Q4. Nyawira Beatrice (Nominated MCA) lamented that NARUWASCO kept sending bills even when it had not supplied water and that some connections were unmetered but were also receiving bills. She asked that the contractor employs youth in the project area and the compensation be paid before works can start.

Answers

The consultant advised that reticulation was not part of the current contract. He said that including it as part of the Itare dam project would have made it too big. That could have made the financiers shy away. He informed them that landowners above the tunnel will not be compensated as landmass below three metres reverts to the state. He also said that the tunnel will be lined to safeguard groundwater. He told them that tunneling will have no impact on the structures above ground for most of the length. He also said that the tunnel will have a pipe 1.2m diameter inside and will be big enough to accommodate a future pipe.

The consultant said that the contractor had been advised to employ locals for unskilled work as much as possible. He also said that compensation will be paid about 6 months before work commences.

Q5. James Lang'at supported the project. He was, however, worried that leaving distribution to the county government would not be a good idea. He suggested a tank be built at Willy Maritim's farm which is a high point that would enable command of the surrounding area.

Q6. Peter Karanja -Mukinyai: requested that the contractor hires locals to do the work and wanted assurance that tunneling will not affect their land. He also wanted assurance that this project will not be like the Ngusso springs project from which they have never gotten water.

Q7. Christopher Monyoncho- Mukinyai was worried that the number of Tees along the pipeline would lead to low pressures and rationing of water. He also wanted distribution to be included in this project. He complained about getting bills for Cheseon water he had never received.

Q8. Peter Bii also wanted distribution as part of the project.

Q9. Sammy Njuguna requested that the project establish HIV resource centers for testing, guidance and counselling for the workers and the community.

Answers

The consultant repeated that distribution will not be part of the project and will not necessarily be done by the County government, rather, he said, funding can be obtained from the County government and given to the Board or NARUWASCO which have capacity to implement. He also clarified that the contractor will use a tunnel boring machine which, unlike drill and blast, does not disturb the surrounding ground. He also said that the water will be sufficient despite the many Tees provided along the way.

Q10. Malakwen asked if the pipeline will pass through people's farms or on the road reserve.

Q11. Sammy Korir asked when the project will start.

Q12. Jeremiah Korir asked that the project consider using the existing tanks for reticulation.

Q13. Rachel Lang'at requested that the tank be put at G.S.U.

Q14. Nehemiah Mose requested that reticulation be done for farms outside the towns.

Answers

The consultant said that the pipeline will pass through B1 and A104 road reserve for most of the part and through farms for sections when going towards tunnel entrance portal and after tunnel exit portal.

5. Conclusion

The Consultant asked those supporting the project to show it by raising their hands. They all raised their hands except one. The meeting ended with a word of prayer.

The participants following the presentation keenly

Eng. Dr. Oonge making his presentation

A stakeholder makes her remarks

Participants showing support for the project

MINUTES FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) & RESETTLEMENT ACTION PLAN (RAP) PUBLIC PARTICIPATION MEETING AT MEETING AT KEDOWA CENTRE

Present

Julius Misoi – Chief Kedowa

Eng. Henry Cheruiyot –Project manager RVWSB

Eng. Dr. Zablon Oonge- Consultant

Eng. Mark Gwena – Consultant

Hesbon Okari- Consultant

Project stakeholders

1. Preamble

Meeting began with a word of prayer and then Chief Misoi of Kedowa led the people through self-introductions. He then let the consultant introduce his team and then present.

The Consultant began by introducing his team that included Eng. Mark Gwena and Hesbon Okari. He began the presentation with the purposes of public participation. The main objective being to inform the public about the project and make them own the project. He dwelt on the project details and explained the works beginning with the source works where there will be a 57 m high Asphalt core rockfill dam. The position of the dam is downstream of the confluence of Sundu, Songol and Ndoinet rivers. The dam will have a mini-hydropower plant producing about 300kW for consumption by project facilities. Then a 1.8 km long 1.2m diameter raw water mains running to a water treatment works with a capacity

of treating 105,000 m3/day. The treatment works facility will also include housing for staff. He emphasized that the source works are located within Nakuru County and that the border with Kericho County is further downstream in the forest where the transmission mains passes through. The pipeline runs for 113 km passing through the forest, then emerges at Chepsir and follows the B1 road through Chepseon up to Kedowa then diverts into Londiani Forest where the 14.3km long and 3.6 m diameter tunnel starts. The tunnel comes out at Sachangwan and follows the A104 road up to Ngata area of Nakuru. In Ngata there are 2No. tanks of 5,000 m3 each. The other tank sites are Prisons, Kelelwet Secondary and KBC Menengai which have 1No. tank each. There will be Tees provided along the pipeline route for supply to Chepsir, Chepseon, Kedowa, Molo, Sachangwan, Elburgon, Njoro, Salgaa townships.

The consultant highlighted the relevant Kenyan laws that make it mandatory to conduct ESIA and RAP as well as the World banks Operational policies. He noted that the financier of the project was satisfied with the use of WB OPs relevant to the project and hence the report was satisfactory for their purpose. He gave a summary of baseline findings about literacy, population, topography and economic activity in the project area. He also explained the anticipated impacts for planning phase, construction phase, operations phase and at decommissioning of the project. He was quick to add that this project might not be decommissioned. In the planning phase, he emphasized land-take by the project as a major impact whose mitigation was fair compensation to the Project affected Persons (PAPs). The positive impacts during construction included jobs, skills acquisition and interaction with people from different cultures. He said the contractor is advised to source for unskilled labour within the project area but was free to bring his skilled workforce. The negative impacts during construction were identified as water, dust and air pollution arising from operation of machinery and excavation of soils. The mitigation suggested included sprinkling water during dry season and having roadworthy equipment.

Q&A

Q1. Joseph Sang- Kimasian asked if the Tees are in the design.

Q2. Julius Lang'at – asked what the consultant meant by reticulation. He also enquired on the capacity of the tank at Chepsir.

Q3. David Sigilai asked whether the compensation will be paid before or after the work starts.

Q4. Charles Korir asked if the rivers will be blocked completely.

Q5. Gabriel Cheruiyot asked how much will be paid as compensation.

Q6. Bett Kipng'eno of Kimasian asked if the contractor will follow labour laws and also requested that the consultant hires from among the locals who have experience working for consultants.

Answers

The consultant informed them that as a general rule, the design consultant does not become the supervising consultant so H.P. Gauff cannot answer for the supervising consultant. The request was thus written for reference. The consultant also assured them that the contractor will follow the Kenyan labour laws and that his contract price was based on the gazzetted laws.

The consultant explained that the dam will store flood waters during the rainy season and that the river flows will be maintained save for the abstraction that will not exceed 6% or 4% during the dry spells. He informed them that there will be no reticulation in the current project and that the Tees are part of the design. He explained that design for reticulation will indicate the size of tank needed at Chepsir.
Eng. Henry rose to clarify that the RVWSB was not in charge of the Kedowa region and as such they could only provide Tees from which KEWASCO, (Kericho Water and Sanitation Company) could connect and distribute to them.
He also said that they will compensate PAPs before works start on their property.

Q7. Richard Yegon asked if there will be any CSR for the community. He also asked if there will be compensation for those whose land is above the tunnel.
Q8. Samuel Koech Ng'eno requested the water be free and especially for the livestock too during dry spells and wanted some CSR.
Q9. Koech Cheruiyot asked if the compensation will factor in appreciation of land and also who will manage the water they will get from this project.
Q10. Willy Koech lamented that the Tees had been provided for townships only leaving out the farms.
Answers
The consultant said apreciation of land will not be factored in paying compensation, rather, prevailing market prices will be used. He also explained that water is supplied to towns because of the number of people who live there justify the investment. He said that putting pipelines to every house in the farms would be costly. He informed them that landowners above the tunnel will not be compensated as landmass below three metres reverts to the state hence they cannot claim ownership.
Eng. Henry rose to explain that CSR had only been planned for the community at the source works (dam area) and that the rest of the route has beneficiaries of the project who should be okay with getting water. He also asked them to request the Lake Victoria South Water Services Board to do reticulation for them including to the farms if possible. He added that the tunnel boring machine method of tunneling will not disturb or destroy property hence they will not need to be compensated.
Q11. Bett Kipng'eno asked if the contractor will build a road in the forest.
Q12. Simon Ruto asked if the jobs for the unskilled people will be shared along the route.
Q13. David Sigilai asked if there will be negotiation during compensation.
Q14. Cheruiyot asked how the contractor will identify a dumping site.
Answers
The consultant said that a road will be built for use during construction and will not be open to the public. He also advised that most labour intensive works will be required at the dam and tank sites. He expected the contractor to use machines to excavate the pipe trench as that would be most economical and faster. He explained that compensation will be based on market rates which are likely to differ along the project route. He added that compensation's purpose is to ensure no one is disadvantaged

by the project but was not meant to make the PAPs richer than they were previously. As for dumping land, it will be the role of the contractor to acquire one and he will be required to do an environmental assessment acceptable by National Environment Management Authority before dumping. He suggested that the locals who would want their land levelled could approach the contractor and ask him to dump on their land.

4. Conclusion

The Consultant asked those supporting the project to show it by raising their hands. They all raised their hands except one. The meeting ended with a word of prayer. The meeting ended at 5:30 p.m.

Participants following the presentation

Eng. Dr. Oonge during his presentation

Eng. HenryCheruiyot, the project manager RVWSB, responds to questions.

Participants raising their hands in support of the project

MINUTES FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) & RESETTLEMENT ACTION PLAN (RAP) PUBLIC PARTICIPATION MEETING AT NDOINET (DAM AREA & ACCESS ROAD)

Present

John Mutai – Chief Ndoinet

David Kipkoech Malel – MCA Tinet Ward

Samuel Kiprono Ngeno – MCA Kiptororo Ward

Eng. Henry Cheruiyot –Project manager RVWSB

Eng. Dr. Zablon Oonge- Consultant

Eng. Mark Gwena – Consultant

Hesbon Okari- Consultant

Project stakeholders

1. Preamble

Meeting started at 11:45 a.m. when Chief Mutai requested Pastor Samuel to lead the audience in prayer. He then let the consultant introduce his team and proceed with the presentation.

2. Presentation by Eng. Dr. Zablon Oonge

The Consultant began by introducing his team that included Eng. Mark Gwena and Hesbon Okari. He began the presentation with the purposes of public participation. The main objective being to inform the public about the project and make them own the project. He dwelt on the project details and explained the works beginning with the source works where there will be a 57 m high Asphalt core rockfill dam. The position of the dam is downstream of the confluence of Sundu, Songol and Ndoinet rivers. The dam will have a mini-hydropower plant producing about 300kW for consumption by project facilities. Then a 1.8 km long 1.2m diameter raw water mains running to a water treatment works with a capacity of treating 105,000 m3/day. The treatment works facility will also include housing for staff. He emphasized that the source works are located within Nakuru County and that the border with Kericho County is further downstream in the forest where the transmission mains passes through. The pipeline runs for 113 km passing through the forest, then emerges at Chepsir and follows the B1 road through Chepseon up to Kedowa then diverts into Londiani Forest where the 14.3km long and 3.6 m diameter tunnel starts. The tunnel comes out at Sachangwan and follows the A104 road up to Ngata area of Nakuru. In Ngata there are 2No. tanks of 5,000 m3 each. The other tank sites are Prisons, Kelelwet Secondary and KBC Menengai which have 1No. tank each. There will be Tees provided along the pipeline route for supply to Chepsir, Chepseon, Kedowa, Molo, Sachangwan, Elburgon, Njoro, Salgaa townships.

The consultant highlighted the relevant Kenyan laws that make it mandatory to conduct ESIA and RAP as well as the World banks Operational policies. He noted that the financier of the project was satisfied with the use of WB OPs relevant to the project and hence the report was satisfactory for their purpose. He gave a summary of baseline findings about literacy, population, topography and economic activity in the project area. He also explained the anticipated impacts for planning phase, construction phase, operations phase and at decommissioning of the project. He was quick to add that this project might not be decommissioned. In the planning phase, he emphasized land-take by the project as a major impact whose mitigation was fair compensation to the Project affected Persons (PAPs). The positive impacts during construction included jobs, skills acquisition and interaction with people from different cultures. He said the contractor is advised to source for unskilled labour within the project area but was free to bring his skilled workforce. The negative impacts during construction were identified as water, dust and air pollution arising from operation of machinery and excavation of soils. The mitigation suggested included sprinkling water during dry season and having roadworthy equipment.

3. Remarks, Questions and Answers

The Consultant suggested that the people ask five questions in a row before he could stand to answer.

Q1. Newton Kirui (Pastor) - Chepkoburot asked if the CSR water project for the community will be free. He also requested that they get free electricity and asked whether they will be compensated.

Q2. Edward Rono- Tinet/Kabongoi said part of his farm had been marked by the surveyors to be within the dam and was expecting compensation.

Q3. Richard Sigilai- Chematich requested for a project to supply free drinking water and a polytechnic to train the youth in the area as CSR. He also wanted compensation to be done under the supervision of the chiefs of the Tinet and Ndoinet.

Q4. Daniel Talam –Chemore requested for a tank at Chemore for water supply. He also wanted the name of the project changed claiming the name ‘Itare’ was not a local name.

Q5. Rachel Korir- Chematich wanted to know the criteria to be used for employment. She hoped for fair distribution of the jobs amongst the villages in the area.

Q6. Leonard Sang- Tinet wanted beacons to be put around the area to be inundated so that owners can know if their land will be inundated. He also wanted any grievances be channeled through the chiefs.

Answers

The consultant answered that if the scheme would require pumping then they will pay some money for maintenance. He informed them that the power to be generated in this project will be too little to share out. He also stated that any genuine PAPs left out in the initial survey will be compensated and that the chiefs will be used during compensation. To those asking for CSR, he noted that the RVWSB was willing to do a water supply project but if they wanted more they were free to request. He answered that the name of the project refers to the river that is formed when the three tributaries meet. He said the

surveyors had put some beacons as guides which were used during the RAP. The RAP team also had GPS to guide them in identifying affected land.

Q7. Joel K. Siele- Tinet: wanted to know who will be compensated if a person resides on a farm whose title is with another person who is not known.

Q8. Stephen Laboso asked that the list of PAPs drawn up earlier be vetted for accuracy using a committee and also wanted the community to be given a seat in the board of NARUWASCO. He also requested that the access road be upgraded to bitumen standards.

Q9. David Sitienei- Tinet requested that any matter regarding the dam involve chiefs from bith locations of Tine and Ndoinet. He also had an issue with the name of the project. He asked if the community water supply project will target all the villages around the dam area.

Q10. Charles Rotich wondered why there will be no compensation yet names of PAPs were written.

Q11. Christopher Yebei-Tinet announced that they will only allow works to start after they get compensated. He also wanted to be a shareholder in the water project.

Answers

The consultant invited the people to vote if they were in favour or against the name 'Itare dam water supply project'. All of them except three people by show of hands said they had no issue with the name and thus the matter of the project name was put to rest. He then advised them that requested to sit on the board of NARUWASCO will be forwarded to RVWSB and that they remain stakeholders of the project through participation in affairs of NARUWASCO. He clarified that compensation to be paid out will depend on how each PAP is affected by the project. He insisted that the land on which the reservoir sits was set aside long time ago for that purpose and it will be wrong for the government to pay them for land that was not theirs. He said such settlers will be entitled to a livelihood assistance that would help them to move to new place. He elaborated that it would cater for disturbance and not will not be compensation for land.

Q12. Edward Mosonik from Chenugu alleged that his farm had been recorded under another person's name and wanted that corrected.

Q13. Calistus Rono supported the project and requested that the contractor hires youth from the locality to work for him in skilled and unskilled tasks.

Q14. Charles Ng'eno wanted compensation for land because livelihood money alone would leave them homeless.

Q15. Michael Kipruto Arap Sang (former councilor) wanted to know how the dam would benefit the people and requested that a polytechnic and secondary school be built for them both in Chematich and Tinet.

Q16. Julius Lang'at asked if compensation will be in terms of land or money.

Answers

Eng. Henry, the project manager, rose to answer the questions and informed them that there was sufficient money for CSR to the tune of 100 million. He thus explained that the money would be enough

for a polytechnic, water supply project and school. He also reminded them that the land on which the reservoir sits was set aside long time ago for that purpose and it will be wrong for the government to pay them for land that was not theirs.

4. Conclusion

The people insisted that they will accept the project to start after they get paid. They also handed over a memorandum of their expectations during construction of the project. The meeting ended with a word of prayer.

Photos

Kengen staff were among invited stakeholders

Eng. Dr. Oonge doing the presentation

A stakeholder makes remarks.

A PAP asks the project manager questions.

The participants listen keenly to the proceedings.

POSTERS USED FOR SENSITIZATION OF THE PUBLIC

RIFT VALLEY WATER SERVICES BOARD

PUBLIC CONSULTATION NOTICE

ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT ON THE PROPOSED ITARE DAM WATER SUPPLY PROJECT

The public and all interested parties are cordially invited to attend consultative meetings to be held in relation to the above water project. The meetings will take place at the location stated below and will comprise an "open house" format at the venue.

The purpose of the meetings will be to provide progress on the detailed design of the proposed Itare Dam Water Supply Project, familiarization with the on-going study for the Environmental and Social Impact Assessment and also to receive public comments and suggestions. Further information can be obtained by contacting the proponent via the consultant, Gauff Ingenieure (020-4445288). Advance written comments are welcomed and will count as part of the exercise.

PLACE	DATE	TIME
Nakuru Menengai Water Treatment Works:- near proposed KBC Tank	Wednesday 11-Nov. 2015	10:30 A.M.

These public consultation meetings are on behalf of Rift Valley Water Services Board (RVWSB), P.O. Box 2451-20100, Nakuru; Tel. 051-2213557; Email: info@rvwsb.go.ke

CHIEF EXECUTIVE OFFICER
RIFT VALLEY WATER SERVICES BOARD

RIFT VALLEY WATER SERVICES BOARD

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ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT ON THE PROPOSED ITARE DAM WATER SUPPLY PROJECT

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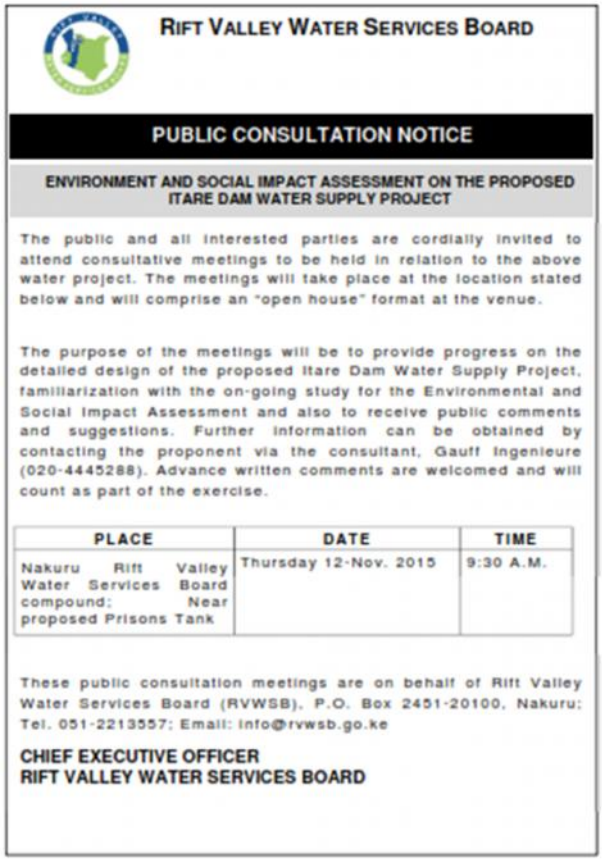
PLACE	DATE	TIME
Kapkures Chief's Camp Nakuru:- near proposed Kelelwet Tank	Wednesday 11-Nov. 2015	2:00 P.M.

These public consultation meetings are on behalf of Rift Valley Water Services Board (RVWSB), P.O. Box 2451-20100, Nakuru; Tel. 051-2213557; Email: info@rvwsb.go.ke

CHIEF EXECUTIVE OFFICER
RIFT VALLEY WATER SERVICES BOARD



RIFT VALLEY WATER SERVICES BOARD

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PLACE	DATE	TIME
Nakuru Rift Valley Water Services Board compound; Near proposed Prisons Tank	Thursday 12-Nov. 2015	9:30 A.M.

These public consultation meetings are on behalf of Rift Valley Water Services Board (RVWSB), P.O. Box 2451-20100, Nakuru; Tel. 051-2213557; Email: info@rvwsb.go.ke

CHIEF EXECUTIVE OFFICER
RIFT VALLEY WATER SERVICES BOARD

RIFT VALLEY WATER SERVICES BOARD

PUBLIC CONSULTATION NOTICE

ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT ON THE PROPOSED ITARE DAM WATER SUPPLY PROJECT

The public and all interested parties are cordially invited to attend consultative meetings to be held in relation to the above water project. The meetings will take place at the location stated below and will comprise an "open house" format at the venue.

The purpose of the meetings will be to provide progress on the detailed design of the proposed Itare Dam Water Supply Project, familiarization with the on-going study for the Environmental and Social Impact Assessment and also to receive public comments and suggestions. Further information can be obtained by contacting the proponent via the consultant, Gauff Ingenieure (020-4445288). Advance written comments are welcomed and will count as part of the exercise.

PLACE	DATE	TIME
Tulwet / Kirobon Reservoir:- near proposed Ngata Reservoir	Thursday 12-Nov. 2015	2:00 P.M.

These public consultation meetings are on behalf of Rift Valley Water Services Board (RVWSB), P.O. Box 2451-20100, Nakuru; Tel. 051-2213557; Email: info@rvwsb.go.ke

CHIEF EXECUTIVE OFFICER
RIFT VALLEY WATER SERVICES BOARD

RIFT VALLEY WATER SERVICES BOARD

PUBLIC CONSULTATION NOTICE

ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT ON THE PROPOSED ITARE DAM WATER SUPPLY PROJECT

The public and all interested parties are cordially invited to attend consultative meetings to be held in relation to the above water project. The meetings will take place at the location stated below and will comprise an "open house" format at the venue.

The purpose of the meetings will be to provide progress on the detailed design of the proposed Itare Dam Water Supply Project, familiarization with the on-going study for the Environmental and Social Impact Assessment and also to receive public comments and suggestions. Further information can be obtained by contacting the proponent via the consultant, Gauff Ingenieure (020-4445288). Advance written comments are welcomed and will count as part of the exercise.

PLACE	DATE	TIME
Kabianga Administration Police Post:- near Sachangwan Centre near the proposed Tunnel Exit	Friday 13-Nov. 2015	9:30 A.M.

These public consultation meetings are on behalf of Rift Valley Water Services Board (RVWSB), P.O. Box 2451-20100, Nakuru; Tel. 051-2213557; Email: info@rvwsb.go.ke

CHIEF EXECUTIVE OFFICER
RIFT VALLEY WATER SERVICES BOARD

RIFT VALLEY WATER SERVICES BOARD

PUBLIC CONSULTATION NOTICE

ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT ON THE PROPOSED ITARE DAM WATER SUPPLY PROJECT

The public and all interested parties are cordially invited to attend consultative meetings to be held in relation to the above water project. The meetings will take place at the location stated below and will comprise an "open house" format at the venue.

The purpose of the meetings will be to provide progress on the detailed design of the proposed Itare Dam Water Supply Project, familiarization with the on-going study for the Environmental and Social Impact Assessment and also to receive public comments and suggestions. Further information can be obtained by contacting the proponent via the consultant, Gauff Ingenieure (020-4445288). Advance written comments are welcomed and will count as part of the exercise.

PLACE	DATE	TIME
Kedowa Chief's Camp:- near the proposed Tunnel Entrance	Friday 13-Nov. 2015	2:00 P.M.

These public consultation meetings are on behalf of Rift Valley Water Services Board (RVWSB), P.O. Box 2451-20100, Nakuru; Tel. 051-2213557; Email: info@rvwsb.go.ke

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RIFT VALLEY WATER SERVICES BOARD

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PUBLIC CONSULTATION NOTICE

ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT ON THE PROPOSED ITARE DAM WATER SUPPLY PROJECT

The public and all interested parties are cordially invited to attend consultative meetings to be held in relation to the above water project. The meetings will take place at the location stated below and will comprise an "open house" format at the venue.

The purpose of the meetings will be to provide progress on the detailed design of the proposed Itare Dam Water Supply Project, familiarization with the on-going study for the Environmental and Social Impact Assessment and also to receive public comments and suggestions. Further information can be obtained by contacting the proponent via the consultant, Gauff Ingenieure (020-4445288). Advance written comments are welcomed and will count as part of the exercise.

PLACE	DATE	TIME
Ndoinet Bridge:- at the proposed Itare Dam site and also for access road to the Sitoito Market at Ndoinet Forest Reserve.	Wednesday 18-Nov. 2015	10:30 A.M.

These public consultation meetings are on behalf of Rift Valley Water Services Board (RVWSB), P.O. Box 2451-20100, Nakuru; Tel. 051-2213557; Email: info@rvwsb.go.ke

CHIEF EXECUTIVE OFFICER
RIFT VALLEY WATER SERVICES BOARD

LIST OF ATTENDANCE FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

MERERONI WATER TREATMENT-WORKS, MILIMANI 11-11-15

	NAME	ID	PHONE NO.	VILLAGE	LOCATION
1	NYABUTI BRIAN	27906579	0727133880	BONDENI	BONDENI
2	BEULAH JEPNG'ETICH	27484985	0728629666	BONDENI	BONDENI
3	RESIATO KOIKAI	91784985	0714265459	BONDENI	BONDENI
4	OMEDO ELIJAH	0638602	0710330450	T-WORKS	MILIMANI
5	GEORGE KINANGA	10018264	0720593450	T-WORKS	MILIMANI
6	MAHENDRA SHAH	189074	0733632875	MILIMANI	MILIMANI
7	PATRICK MATINDI	11615468	0722769113	MILIMANI	MILIMANI
8	JOHN KIBICHO	-	0722746883	MILIMANI	MILIMANI
9	BENJAMIN BIRGEN	6420110	0722704580	MILIMANI	MILIMANI
10	EMONDE PATRICK	11047847	0721798704	MILIMANI	MILIMANI
11	ANNE RAKWACH	1812115	0721373 550	MILIMANI	MILIMANI
12	CHIEF JOEL ATUTI	8345303	0714 699777	MILIMANI	MILIMANI
13	SAMUEL KANYORO	3052107	0721 254000	MILIMANI	MILIMANI
14	NOAH BARASA	0330845	0723340344	MILIMANI	MILIMANI
15	DAVID KIGEN	9565760	0722358578	KOINANGE	KOINANGE
16	ANNASTASIA GITAU	8443382	0722593312	KIAMUNYI	KIAMUNYI
17	PURITY CHEROTICH	23161020	0720844266	RACECOURSE	RACECOURSE
18	LYNETT IZIMA	22083836	0721556199	KIAMUNYI	KIAMUNYI
19	LILY NGATHI	0733130	0722425393	MILIMANI	MILIMANI
20	HESBON OKARI	24452696	0723728149	NAIROBI	NAIROBI

KELELWET SECONDARY SCHOOL 11-11-15

	NAME	ID	PHONE NO.	VILLAGE	LOCATION
1	GLADYS ORWASA	10195245	0722498813	KIPTENDEN	BARUT
2	CHERUIYOT KANGOGO	11379107	0723233681	BARUT WARD	(ADMINSTRATOR)
3	HESBON OKARI	24452696	0723728149	NAIROBI	NAIROBI
4	DR. ZABLON OONGE	6412436	0733750231	NAIROBI	NAIROBI
5	ENG. MARK GWENA	8745128	0722459444	NAIROBI	NAIROBI
6	CHIEF RASHID ABDALAH	5559556	0727179503	KAPKURES	KAPKURES
7	EVANS KERING	20171740	0721619997	LALWET	KAPKURES
8	THOMAS KIBET	22623935	0723443366	LALWET	KAPKURES
9	JACOB SIGILAI	13171545	0724145304	BARUT	BARUT
10	JOEL NGERECHI	0990612	0725460165	BARUT	BARUT
11	ERIC LANGAT	11116673	0771087763	LALWET	BARUT
12	DAVIS ROTICH	12835626	0724262505	INGOBOR	KAPKURES
13	LAWRENCE KISOI	23338888	0734032267	LALWET	BARUT
14	SAMSON KOSKE	0512361	0720548695	KAPKWEN	BARUT
15	SALLY LANGA	1767776	0722423791	INGOBOR	KAPKURES
16	DANIEL CHESIMEI	0441534	0721411062	KELEKWET SEC	BARUT
17	JOSEPH SIGEI	0746190	07279399065	KIGONOR	BARUT
18	STANLEY NGENO	11715893	0720855540	LALWET	KAPKURES
19	JAMES ABUGA	1375099	0724723085	KELEKWET SEC	BARUT
20	JULIAH SULEMAN	10013646	0720385063	KELEKWET SEC	BARUT
21	SAMY RONO	10658750	0714189845	KELELEWET	BARUT
22	BOINET KEPKERICH	11506586	0722405548	KELELEWET	BARUT
23	SAMWEL ODERO	7165854	0708958701	KELELEWET	BARUT
24	SAMWUEL RONO		0708696749	KELELEWET	BARUT
25	BERNARD RUTO	23679044	0710458181	KELELEWET	BARUT
26	BERNARD YEGON		0714837262	KELELEWET	BARUT
27	CHARLES TOO	21828185	0726923936	LALWET	BARUT
28	PETER KOSKEI	20988424	0711584313	LALWET	BARUT
29	KENNEDY KOSKEY	28256486	0715320143	KELELEWET	BARUT
30	THOMAS LANGAT	1062449	0712407984	KELELEWET	BARUT
31	CHARLES KOSKEI	22890621	0752606238	KELELEWET	BARUT

32	BEATRICE KOSKEI	21828185	0718683101	LALWET	BARUT
33	SIMON K. LANGAT	25699516	0707656958	KELELEWET	BARUT
34	PETER K. TANUI	22639349	0724913472	KIGONOR	BARUT
35	BENSON M. MUKASA	23111980	0727823281	KELELEWET	BARUT
36	BENJAMIN SANG	25534479	0728153030	KELELEWET	BARUT
37	STEPHEN NDENDERU	9836180	0720000919	KAMUNANDI	KAPKULESH
38	MOSES JAUKO MUKASA	24988620	0711428314	KELELEWET	BARUT
39	DAMIEN N. KOSKEI	0865661	0718702797	KELELEWET	BARUT
40	JAMES E. LOCHUCH	10773215	0704330953	KELELEWET	BARUT
41	SAMSON K. CHUMA	5976499	0721322360	MOGOON	KAPKURES
42	LUCY J. KIPKOSGEY	12853034	0714880687	LALWET	KAPKURES
43	JACOB K. RUTO	0324093	0722283888	KIPTENDEN	BARUT
44	PASTOR JOSEPH TOBON	7133609	0720371295	LALWET	KAPKURES
45	DANIEL T. TOBON	3638081	0721291043	LALWET	KAPKURES
46	SAMUEL K. NGENO	0269001	0721818412	SOIMET	BARUT
47	STEPHEN K. MARITIM	6244505	0722488338	SOIMET	BARUT
48	RONOH J. KIPLANGAT	11715695	0727596032	LALWET	KAPKURES
49	STANLEY NG’ENO	11715893	0720855540	LALWET	KAPKURES
50	FRANCIS K. SIGEI	9815427	0720692747	BARUT	BARUT
51	JOHNSON SIGEI	6618470	0724967579	LALWET	KAPKURES
52	SAMUEL SOY	0873512	0710195202	KIGONOR	BARUT
53	MOSES KOSKEI	2316578	0721433651	KELELEWET	BARUT
54	RICHARD K. SIGEI	20147058	0728051100	KELELEWET	BARUT
55	ELIJAH K. CHUMO	12439219	0715952354	LALWET	KAPKURES
56	DAVID K. LANGAT	24644959	0720949997	LALWET	KAPKURES
57	WESLEY KIRUI	33012301	0707021710	LALWET	KAPKURES
58	JACOB M. RUTO	20752190	0721219594	TACHASIS	KAPKURES
59	JANE MAIMBET	2315203	0727312892	LALWET	
60	JOSPHIN LANGAT			LALWET	

RIFT VALLEY WATER SERVICES BOARD YARD

	NAME	ID	PHONE NO.	VILLAGE	LOCATION
1.	COLLINS OTUKHO	27718024	0710886052		
2.	FLORENCE MURIITHI	32096851	0703830322	SHABAB	NAKURU TOWN
3.	PHYLLIS NGENDO	31010175	0716260339	SHABAB	NAKURU TOWN
4.	RICHARD WAWERU	3233018	0723896673	G.K PRISON	NAKURU
5.	JULIUS KARIUKI	22955902	0707221261	LONDON	NAKURU
6.	HELLEN W. KAMAU	0084995	0720219995	HILLTON	NAKURU
7.	MAURICE OLAGO	2877164	0728518245	MILIMANI	NAKURU
8.	DAVID KIGEN	9865160	0722358518	SHABAB	NAKURU
9.	YOSHIKO SAYAMA				NAKURU
10.	KEZIAH NDABA	22879645	0721232924	LONDON	NAKURU
11.	PETER KAIRU	12840259	0721412946	LONDON	VIWANDA
12.	ESTHER NYAMBURA	24795907	0724011676	LONDON	VIWANDA
13.	MAGDALENE GULARIRE	0864213	0724980751	LONDON	VIWANDA
14.	GLADYS JEMUDAVE	09777111	0721926721	LONDON	VIWANDA
15.	JOAQUM SANTIAGO	13821090	0710396053	SOILO	VIWANDA
16.	JOSEPH NGATIA	29289394	0717723092	LONDON	VIWANDA
17.	CATHERINE MUCHUNU	0729085316	0729085316	RVWSB	LONDON
18.	GRACE BOWEN	0722790008	10081894	RVWSB	LONDON1
19.	PERES JUMA	8662767	0725671346	RVWSB	LONDON
20.	CHEBET REHEMA		0715212182	RVWSB	NAKURU
21.	BRIAN NYABUTI	27906578	0727133880	BONDENI	BONDENI
22.	BEULAH JEPNGETICH	27484985	0728629666	BONDENI	BONDENI
23.	JOEL KOECH	0304917	0721366908	LONDON	LONDON

24.	JOSEPH KINGORI	0740819	0720039000	LONDON	LONDON
25.	CAROL WANJIKU	25626654	0729822831	LONDON	LONDON
26.	SIMBA ONYANSI	10511123	0721865082	LONDON	LONDON
27.	MAURICE OLAGO	2877164	0702851824 5	MILIMANI	NAKURU
28.	DAVID KIGEN	9865560	0722858518	SHABAB	SHABAB
29.	NEHEMUA MUIRURI	1372374	0706420770	LONDON	LONDON
30.	SIMON MAINA	6622498	0726661942	K.M.C.	LONDON
31.	BANCY CHEGE	5507462	0722605406	RVWSB	MAJI PLAZA
32.	LEAH TANUI	10877599	0722569807	RVWSB	MAJI PLAZA
33.	JOSEPH YEGO	3505041	0726752515	RVWSB	MAJI PLAZA
34.	GLADYS J. MUDAVE	9777111	0721926721	LONDON	LONDON
35.	JOSEPH NGATIA	29289394	0717723092	LONDON	LONDON
36.	CATHERINE MUCHUNU	10192888	0729085316	RVWSB	LONDON
37.	KODOSI NASHIPAE	31812343	0719361901	RVWSB	LONDON
38.	DAVID KIMORA	24470396	0726857242	LONDON	LONDON
39.	LILIAN CHEPCHUMBA	11757121	0722601233	OLIVEJUU	KIAMUNYI
40.	ASUNDA JOSHUA	32583802	0720805238	RVWSB	LONDON
41.	HESBON OKARI	24452696	0723728149	NAIROBI	NAIROBI
42.	ENG MARK GWENA	8745128	0722459444	NAIROBI	NAIROBI
43.	DR. ZABLON OONGE	6412436	0733750231	NAIROBI	NAIROBI
44.	ENG. H.K. CHERUIYOT	11368564	0722824368	NAKURU	NAKURU
45.	A.CHIEF JOSEPH MBURU	9934805	0723170696	LONDON	VIWANDA
46.	ALCHIEF JOEL ATUTI	83453003	0714699777	MILIMANI	MILIMANI
47.	D M. K.MLORI	8809726	0720211618	LONDON	VIWANDA
48.	ALICE W. MWATHI	1866436	0720701223	LONDON	VIWANDA
49.	HIRAMU NYATHI	088099081 7	0724799160	LONDON	VIWANDA

50.	SIRIBA ONYANSI	10511123	0721865082	LONDON	VIWANDA
51.	MAURICE OLAGO	2877764	0728518245	MILIMANI	NAKURU
52.	CAROLYN WANJIKU	256266561	0729822831	LONDON	LONDON
53.	JOSEPH KINGORI	0740819	0720039000	LONDON	LONDON
54.	JOEL KOECH	0304917	0721366908	LONDON	VIWANDA
55.	FRANCIS NJOROGE	25707426	0725370050	MCA LONDON	VIWANDANI
56.	LEWIS TIKANI	22501573	0721564631	SEC 58	SEC 58
57.	MARY WANYOIKE	3094790	0722925087	RACECOURSE	RACECOURSE
58.	JASON OMWAKE	0329637	0721231242	KIONGORORIA	GREEN STEDS
59.	LUCY MBURU	7910389	0722576305	KIOMUNYI	KIAMUNYI
60.	JOSEPH NGATIA	29289394	0717723092	KIWANDA	LONDON
61.	EUAKIM MWANGI	3504104	0722861196	KIWANDA	LONDON
62.	DANIEL KIPLAGAT	30486985	0718468026	KIWANDA	LONDON
63.	CAROLINE CHERONO	32094261	0705325646	LONDON	LONDON
64.	VINCENT INGANJI	13345338	0723888646	LONDON	LONDON
65.	JARED MAGETO	25392052	0726695459	LONDON	LONDON
66.	JOSEPH K. NYAKUNDI	0869271	0722863178	BANGLADESH	VIWANDA
67.	JOSEPH K. RONO	0568569	0720451097	KOINANGE	SHABAB
68.	SAMUEL SIGEN	0082595	0720000992	KOINANGE	SHABAB
69.	ANNASTASIAH W. GITAU	8443382	0722593312	KIAMUNYI	LONDON
70.	REUBEN K. KORIR	10511272	0722780537	NGATA	NGATA

KIROBON TANKSITE

1	SAMWEL YEGON	9815896	0722660157	NGATA	NGATA
2	DAVID K KIRUI	3625485	0720451033	NGATA	NGATA
3	EVANS ONGERI	9314392	0727777399		KIAMUNYI
4	LUCIA AKAI	12541461	0725608289	NGATA	NGATA
5	WILLIAM KIPCHUMBA	11378848	0721204353	NGATA	NGATA
6	RUTH TINDI	11530444	0714284000	NGATA	NGATA
7	BENARD OMWANDHO	27971923	0713977770	NGATA	NGATA
8	DENNIS K NGENO	29835437	0700355515	RORET	NGATA
9	RAYMOND CHERUIYOT	0403078	0722772642	NGATA	NGATA
10	MILLICENT C KISOMBE	0981234	0707278283	RORET	NGATA
11	ANNASTASIAH W GITAU	8443382	0722593312	KIAMUNYI	LONDON
12	BENARD KURGAT	2282277	0729502393	KAPTATET	NGATA
13	KIRUI HILLARY	27670004	0710797621	TULWET	NGATA
14	RICHARD	9163955	0724019392	NGATA	NGATA
15	DOUGLAS YATOR	11841486	0726487771	KIBORON	MENENGAI
16	J CHELANGAT	0578085		KIPTENDEN	NGATA
17	WALTER NGETICH	5307615	0721308954	NGATA	NGATA
18	WILLIAM KOSILE	4291982	0720868045	KIPTENDEN	NGATA
19	DAVID K KOECH	5976618	0721241374	KIROBOR	NGATA
20	WILFRED MORANGA	1581261	0722601161	NGATA	MITI MOJA
21	ELIJAH NYABUTI	27401832	0723227820	NGATA	MITI MOJA
22	BENEDICT SHIHANI	10724780	0728420328	KIROBOR	KIROBOR
23	DAVID ARAP BETT	1882614	07277927585	NGATA	NGATA
24	SAMWEL CHERUIYOT	084441	0729965213	NGATA	NGATA
25	CHEBET REHEMA		071947207	RVWSB	NAKURU
26	JOSHUA ASUNDA		0770805238	RVWSB	NAKURU
27	DAVID KIGEN		0722358518	RVWSB	NAKURU
28	RICHARD KIRUI	10014976	0718646463	NGATA	NGATA
29	ALFRED K CHERUIYOT	29580013	07173322918	KIROBON	NGATA
30	ELIJAH K CHELAITE		0720852103	RORET	
31	LAZARO KOECH			RORET	
32	PAUL RUTTOH	2312210	07283844359	KAPTICH	MENENGAI
33	PIUS K A	0333477	0721774507	TULWET	KIROBON
34	SARAH C KOSKEI	16093109	0722246926	KAPTICH	MENENGAI
35	ELIMA KISOMBE	2312360	0728499567	RORET	NGATA
36	LINA RONO		0718681048	KIROBAN	NGATA
37	JOYCE KORIR		0716250963	RORET	NGATA
38	PHILIP SITIENEI	20579400	0724691197	NGATA	NGATA
39	CHERUON AMASON			NGATA	NGATA
40	AMBROSE O NGARE	2970776	0722956659	NGATA	NGATA
41	HILLARY MOKURI	13623466	0733559535	NGATA	NGATA

42	RICHARD CHELULE RUTTO	20395834	0720640978	NGATA	NGATA
43	ALEX CHACHE ONKOBA	5846872	0721211804	NGATA	NGATA
44	SANG ELIUD KIPTOO	13622035	0722115115	NGATA	NGATA
45	REUBEN K KORIR	10511272	0722780537	NGATA	NGATA

SACHANG'WAN CENTRE

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION
1	HESBON OKARI	24452696	723728149	NAIROBI	NAIROBI
2	RACHAEL MARU	13622345	721586790	CHESOETY	KABIANGA
3	PHILIP KIRUI	1334127	721492972	BOROP	SACHANGWAN
4	REV JACKSON ANGUNZA	2328358	710661501	KABIANGA	KABIANGA
5	MCA BEATRICE NYAWIRA	12745281	722797827	MOLO	MOLO
6	REV JULIUS K LANGAT	6606585	724619243	SACHANGWAN	SACHANGWAN
7	BENARD KIBETT	22967472	720352257	SACHANGWAN	SACHANGWAN
8	PAUL BIEGON	11718427	722683000	SACHANGWAN	MOLO
9	JAMES KARIUKI	6667060	704566223	SACHANGWAN	SACHANGWAN
10	JOSEPH BII	13621900	720641515	MIGAA	MUKINYAI
11	ELIZABETH NJERI MWANGI	20385914	717470721	MIGAA	MUKINYAI
12	ESTHER KENDUIYWA	1100976	704150380	SACHANGWAN	SOIN
13	JOSEPHINE N. NGIGE	3622651	710645606	MUKINYAI	MUKINYAI
14	MARY NYANGWESO	7082478	728948048	SACHANGWAN	SACHANGWAN
15	JOSEPHINE CHEPKIRUI	6665792	726292868	KABIANGA	KABIANGA
16	JOHANA RUTO	6061880	723454722	SACHANGWAN	SACHANGWAN
17	RACHAEL LANGAT	6666468		BOROP	KABIANGA
18	SANG BETTY	11717383	727023013	SACHANGWAN	SACHANGWAN
19	FLORENCE KOSKEI	20667643	716909242	SACHANGWAN	SACHANGWAN
20	SYLVAN P. MOSOTA	0096924	722605574	SACHANGWAN	SACHANGWAN
21	MILCAH MWANGI	24924668	719640368	MUKINYAI	MUKINYAI
22	JEREMIAH KIARIE	24663805	724419968	MCA'S OFFICE	MUKINYAI

23	SAMMY NJUGUNA KANGA	24174507	723531324	MOLO	MOLO
24	JOHN KUNYIHA KAMAU	1101021	715439760	KIMANYI FARM	KABIANGA
25	IBRAHIM MALEL	108455	717071364	CHESOETO	KABIANGA
26	GILBERT TUWEI	3627150		KIMANYI	KABIANGA
27	SIMON LANGAT	20602654	703737975	CHASILONGO	SACHANGWAN
28	ZIPPORAH KWAMBOKA	11702871	725156112	SACHANGWAN	SACHANGWAN
29	JACKLINE MOKAMBA	20693490	714023327	SACHANGWAN	SACHANGWAN
30	JOSEPHINE NYABOKE			KABIANGA	SACHANGWAN
31	SARAH OMWOYO	25110146	720752557	SACHANGWAN	SACHANGWAN
32	REBECCAH SARAH		701122762	SACHANGWAN	SACHANGWAN
33	NAOMI WANGARI			KIMANYI	SACHANGWAN
34	JOYCE WAMBUI			KIMANYI	SACHANGWAN
35	SIMON LEMEI		714397475		
36	ATITI MARY				
37	GRACE CHERONO	7534510	704512464	CHESOEN	SACHANGWAN
38	SALLY CHEPGETIA	11463692	725166849	KIMAYEK	SACHANGWAN
39	MONICA WANJIKU		716909241	SACHANGWAN	SACHANGWAN
40	ROSEMARY WAMBUI	8749798	711962617	KIMANYI	SACHANGWAN
41	SANG ISAAC	22501934	725960515	KAPSOIT	SACHANGWAN
42	SHADRACK KIRUI	2817304	712912913	KAPSOIT	SACHANGWAN
43	GEOFFREY SUDI	22972891	716926149	CHESOEN	SACHANGWAN
44	MALAKWEN ARAP	8285128	716444363	SOINA	SACHANGWAN
45	HELLEN KEMUNTO			SACHANGWAN	SACHANGWAN
46	GRACE KWAMBOKA	2328116	729052552	KIMANYI	SACHANGWAN
47	WANJIKU MWANGI	1100977	718964862	KIMANYI	KABIANGA
48	JANE NJERI	1845684	721700176	KIMANYI	KABIANGA

49	ESTHER CHEPKOECH	2328874	710651825	CHICHON	KABIANGA
50	RUTH WANGARI	22227214	710998314	KIMANYI	KABIANGA
51	EMILY SITIENGI	2422263	720846941	KIMANYI	KABIANGA
52	SAMUEL MBURU	4408944	724316332	SACHANGWAN	SACHANGWAN
53	MANSELA NANJAMA OTIMU	0743378	716234456	KIMANYI	SACHANGWAN
54	JOSEPH OSORO MBEGA	7131132	739161828	KIMANYI	SACHANGWAN
55	GITONGA NJOROGE	7886718	729046159	SACHANGWAN	SACHANGWAN
56	PETER KARANJA	2962189	721334120	MUKINYAI	MUKINYAI
57	SAMMY KORIR	7104522	716028699	SACHANGWAN	SACHANGWAN
58	JOSEPH MOSEE	0742663	714631916	KIMANYI	KABIANGA
59	JOSEPH MUGANE	6061652	714041710	MUKINYAI	MUKINYAI
60	AMOS AGAWOMBA	0152028	724648153	MUKINYAI	SACHANGWAN
61	JEREMIAH KIRUI	12436422	720398449	KIMANYI	KABIANGA
62	CHEGE MWAURA	10774881	710256584	MUKINYAI	MUKINYAI
63	ANDREA OMWOYO	1101507	725281184	KIMANYI	KABIANGA
64	LABAN ONGERA	5830158	731629031	KIMANYI	KABIANGA
65	DAVID KARANJA	0743980		KIMANYI	KABIANGA
66	ZACHARIA ASOYA	4103586	700132020	KIMANYI	KABIANGA
67	ENG. MARK GWENA	8745128	722459444	NAIROBI	NAIROBI
68	ANGELA WANYAMA	12745256	721466139	SACHANGWAN	SACHANGWAN
69	JOEL CHEPKWONY	11522233	723793963	CHESOEN	SACHANGWAN
70	PAUL TESOT	0605533	722660529	SACHANGWAN	SACHANGWAN
71	PAUL KINYANJUI CHEGE	9126017	724150969	MUKINYAI	MUKINYAI
72	EVANS MAGETO	8948706	729281140	SACHANGWAN	SACHANGWAN
73	JOHNSON TUEI	7104579	716558152	SACHANGWAN	SACHANGWAN
74	SAMMY	12745463	721881240	KABIANGA	KABIANGA

75	JAMES LANGAT	6353230	724688206	KABIANGA	KABIANGA
76	OKIOGE KENNEDY	11112306	728532504	SACHANGWAN	SACHANGWAN
77	JAMES WAHOME	7083752	714197823	SACHANGWAN	SACHANGWAN
78	DANIEL GACURI	10510294	710356196	MUKINYAI	MUKINYAI
79	FLORENCE NYAKERARIO	2323630	704512462	GETINGE	GETINGE
80	MOSES OGETO	4101199	710879917	POMBO	KABIANGA
81	SAMIN MOSIRI	1607078	725748140	POMBO	KABIANGA
82	REUBEN RUTO	1320389	723997609	SACHANGWAN	SOIN
83	DAVID KIGEN		722358518	NAKURU	NAKURU
84	CHRISTOPHER MONYUTO	03789940	724461573	SACHANGWAN	KABIANGA
85	MAY WAMBOI		720494061	SACHANGWAN	KABIANGA
86	SAMMY TOWET	13127956	710528632	SACHANGWAN	SACHANGWAN

KEDOWA

1	SAMWEL ABI	1751483	0717114350	EWAT	KEDOWA
2	JOHN KIPTANUI ROTICH	17170824	071036380	EWAT	KEDOWA
3	RONALD MONGARE	7572918	071320388		
4	PETERSON ROTICH	120542082	0721686222	EWAT	BROOK
5	BASHIR KIPRONO KIRUI	21699015	0722785933	SAOSET	BROOK
6	DAVID KIPROTICH MALEL	20296192	0721324686	LAMAIYAT	KEDOWA
7	WESLEY KIPNGETICH	20297653	0727099597	LAMAIYAT	KEDOWA
8	DENNIS KIBET	27717346	0723396804	CHEBENOR	KEDOWA
9	KIPSOI NELSON	12918668	0724510688	TESTAI	KEDOWA
10	ALFRED KIPLANGAT	3840802	0700813298	CHEBENOR	KEDOWA
11	DANIEL KABOR	6606791	0710859540	CHESUNOT	KERICHO
12	JOSEPH KIBET BORE	6015058		KINYEMIT	CHEPSEON
13	JOSEPH SIMTWO	5241711	0726012275	KIPLEKWA	KEDOWA
14	ERICK KIPKOECH	2341846	0723981328	CHEPSIR	KIPSEGEN
15	EDMOND MUTAI	22710464	0721150584	KIMASIAN	KEDOWA
16	KIPKOECH SIMON	30813327	0726059178	CHEBENOR	KEDOWA
17	GEOFFREY KIBET	02590356	0719606094	KIPMASHAN	KEDOWA
18	THOMAS K NGETICH	27620222	0726564052	KEDOWA	KEDOWA
19	DANIEL CHERUIBOT	22366344	0721977197	KEDOWA	KEDOWA
20	BETT KIMUTAI WESLEY	20392509	0715811528	EWAT	KEDOWA
21	CHERUIYOT ROBERT	32851895	0719707159	KISABO	KIMUNGUL
22	KENNETH KIPLANGAT	12918614	0720857834	CHEBOWOR	KEDOWA
23	DAVID KIPKEMOI	11079657	0725890026	LAMBEL	KEDOWA
24	ELISHA KIPRONO YEGON	23115402	0720945390	LAMBEL	KEDOWA
25	ERICKSON KIPKOECH	22262948	0729535844	CHEBEWOR	KEDOWA
26	LEONARD KIPKEMOI	20283673	0725435115	KEDOWA	KEDOWA
27	BENSON LANGAT	24914918	0716424822	KISABO	KIMUGUL
28	CORNELIUS KIPLAGAT RUTO	26801478	0712956163	CHEPSION	KIMUGUL
29	JOSPHAT TENER	25227616	0727359595	KEDOWA	KEDOWA
30	LANGAT K JULIUS	20283473	0726460505	KIMASIAN	KEDOWA
31	PHILIP KIPLANGAT	31102622	0720931974	KIMASIAN	KEDOWA
32	BENARD CHEPKWONY	3863635	0726328606	KEDOWA	KIMASIAN
33	CHARLES ROTICH	21581433	0724248183	KIMASIAN	KIMASIAN
34	GILBERT KIGEN	26676415	0726466689	CHEPSEON	CHEPSEON
35	MUTAI SAMMY	2419769	0721559913	KABISOI	KIMASIAN
36	ROSE C NGENY	22591719	0704068197	LAMBEL	KEDOWA

37	JOHN BETT	11069909	0713329725	KIMASIAN	KEDOWA
38	RICHARD BETT	1764889	0724885843	TUYOBOI	CHEPSEON
39	KENNEDY LANGAT	28964926	0701860956	CHEBEWOR	KEDOWA
40	AADANE LANGAT	5246366	0715173129	LONDIANI	LONDIANI
41	WILLIAM K LANGAT	10383371	0729280633	LONDIANI	
42	PATRICK A BETT	9815575	0717386535	LONDIANI	
43	SIMION KOSKEI	20916219	0703897037	KEDOWA	
44	CHARLES K KORIR	27154218	0715706060	KEDOWA	LONDIANI
45	JOHN K LELE	1402807	0710101350	KONSAMEI	
46	SARAH TOEI	11202496	0720203134	CHEBEWOR	
47	JAMES K NGETICH	21569496	0721414693	NDARUGU	KEDOWA
48	ROP GEOFFREY	20097527	0722263143	NDIMA	
49	DAVID KOSTANY	9732683	0715816513	NDARUGU	KEDOWA
50	KIPKOECH CHERUIYOT	27518225	0706087749	KEDOWA	KEDOWA
51	KIPNGENO SILEIL	23077138	0712986978	KEDOWA	KEDOWA
52	BENARD KOSUPKE	29727767	0726925374	KEDOWA	KEDOWA
54	RONO SHADRACK	32658790	0701005225	EWAT	KEDOWA
55	ATHANAS LANGAT	12916584	0723202077	MOMONIAT	
56	PIUS MUTAI	6008646		KIMASIAN	
57	AGUSTINE BETT	25993218	0706081122	KEDOWA	KIMASIAN
58	NAHASON K KORIR	20004525	0700038426	EWAT	KEDOWA
59	DAVID K BETT	8602989	0722278950	KEDOWA	KEDOWA
60	PATRICK A KIRUI	5418239	0724574753	KEDOWA	KEDOWA
61	WILLY KOECH	3857674	0725677677	KEDOWA	KEDOWA
62	RICHARD K SOI	4426406	0728986421	KEDOWA	KEDOWA
63	JOHANA KOROS	0134535	07238855460	KIPTORORO	KEDOWA
64	JOSEPH SANG	1771668	0721971363	KIMASIAN	KIMASIAN
65	EDWIN KIPNGENO ROTICH	11718061	0728762258	CHEPSEON	CHEPSEON
66	HENRY SANG	20399734	0701536284	KEDOWA	
67	KIPNGENO BETT	23928318	0718893867	KIMASIAN	KIMASIAN
68	EDWIN KOECH	25530915	0712295482	KIMUGUL	KIMUGUL
69	DANIEL SIGILAI	13011606	0725455324	TULWAP	KEDOWA
70	WESLEY RONO	7653544	0712295482	KIMASIAN	KIMASIAN
71	EVALINE CHEPCHIRCHIR	28578513	0790148186	KEDOWA	KIMASIAN
72	PAUL KOECH	8549312	0722382606	KEDOWA	KEDOWA
73	HESBON OKARI	24452696	072372819	NAIROBI	NAIROBI
74	JULIUS MISOI	4753265	0726916318	KEDOWA	KEDOWA
75	DR.ZABLON OONGE	6412436	0733750231	NAIROBI	NAIROBI
76	ENG. MARK GWENA	8745128	0722459494	NAIROBI	NAIROBI
77	KIRUI ENOCK	28662239	0715160016	KEDOWA	KEDOWA
78	JOHN K NGETICH	8207614	0715124077	KEDOWA	KEDOWA
79	RICHARD K YEGON	7652632	0701073191	KEDOWA	KEDOWA

80	COLLINS K TANUI	29144112	0726701068	KEDOWA	KEDOWA
81	BENARD K TANUI	24707614	0726058180	CHEBEWOR	KEDOWA
82	ERICK K KOECH	32604107	0728746914	CHEBEWOR	KEDOWA
83	DANIEL RUTOH	14440021	0726224548	CHERIBO	KIMASIAN
84	DAVID K SIGILAI	7630122	0723681073	CHEBEWOR	KEDOWA
85	SAMMY KOECH NGENO	2314171	0751743217	KIPTIMET	CHEPSEON
86	SIMON RUTOH	10771479	0726743117	CHEBEWOR	KEDOWA
87	DAVID K RUTOH	8753682	0728629825	CHEBEWOR	KEDOWA
88	RICHARD CHERUIYOT	11526612	0728820744	CHEBEWOR	KEDOWA
89	DAVIES K TUEI	25187841	0725187841	CHEBEWOR	KEDOWA
90	DAVID KIRUI	3834525	0720723746	TESTAI	KEDOWA
91	PAUL K LANGAT	8548319	0729565626	KEDOWA	KEDOWA
92	GABRIEL CHERUIYOT	1762527	0724428658	CHEBEWOR	KEDOWA

NDOINET KWA BRIDGE

	NAME	ID			LOCATION
1	EDNA CHERONO	206272545	0706120037	TAITA	TINET
2	EDNA CHEPKSECH	20347024	0708412849	TAITA	TINET
3	ALVINA MUTAI	11116597	0705701682	CHEPKOBROT	KIPTORORO
4	ANNAH C.SOI	7960512		KIPTENDEN	TINET
5	CHRISTINE MUTAI	4750290		CHEPKOBOROT	KIPTORORO
6	ROSE C MAIYWA	1774545	0702939723	CHEPKOBOROT	KIPTORORO
7	JOYCE C CHEMIRIOT	20463961	0713493899	CHEPKOBOROT	KIPTORORO
8	BENEDINE J KEMBOI	20575267	0727676720	CHEPKOBOROT	KIPTORORO
9	JOYCE CHEPKEMOI	25546646	0712143870	CHEPKOBOROT	KIPTORORO
10	JACKLINE C SITIENG	22618057	0705608844	CHEPKOBOROT	KIPTORORO
11	EVERLINE C LANGAT	20300330	070004620	CHEPKOBOROT	KIPTORORO
12	SELLY C KOECH	1743844		CHEPKOBOROT	KIPTORORO
13	HELLEN CHEPKOSGEI	11207519		KAPSONGOK	TINET
14	EMILY C MURUSOI	20729718	0707808824	SACHANGWAN	KIPTORORO
15	ROSE C MIBEI	11369094	0728244513	TITIRA	KIPTORORO
16	LEAH C MILGO	6021464		CHEPKOBURET	KIPTORORO
17	JANETH C CHEPKWONY	25793998	0723097607	KIPTENDEN	TINET
18	ANGELINE C ROTICH	20318320	0700814774	KIPTENDEN	TINET
19	DINA CHEMTAI	20556176	0729358091	KIPLONG	KIPTORORO
20	BEATRICE CHELANGAT	26932847	0706654735	KIPTENDEN	TINET
21	SALLY C NGASURA	7632045		CHEPKOBOROT	KIPTORORO
22	ELIZABETH LAGAT	7082590	0702591465	CHEMATICH	KIPTORORO
23	STEPHEN CHERUIYOT	7639342	0724479315	CHEPKOBOROT	KIPTORORO
24	DAVID CHERUIYOT	8846596		CHEPKOBOROT	KIPTORORO
25	KIPROTICH CHIRCHIR	28740184	0728385098	CHEPKOBOROT	KIPTORORO
26	KIPKEMOI PILIMON	20218454	0723923076	CHEPKOBOROT	KIPTORORO
27	JULIUS JORUS	32080423	0703402653	CHEPKOBOROT	KIPTORORO
28	RICHARD NGETICH	12937532	0727170756	CHEPKOBOROT	KIPTORORO
29	KUGO TEMUGEI	24897		CHEPKOBOROT	KIPTORORO
30	JOHN MILGO	21011553	0724817824	CHEPKOBOROT	KIPTORORO
31	DAVID KOECH	12483971	0702586484	CHEPKOBOROT	KIPTORORO
32	DAVID MAGERER	21241760	0703329051	CHEPKOBOROT	KIPTORORO
33	RUBEN SIGILAS	4752175	0723253444	CHEPKOBOROT	KIPTORORO
34				CHEPKOBOROT	KIPTORORO
35	ANDREA A CHEPKWONY	8660348	0720023830	CHEPKOBOROT	KIPTORORO
36	SAMWEL B	3852513	0713182471	CHEPKOBOROT	KIPTORORO
37	PHILIP CHERUIYOT	95372030		CHEPKOBOROT	KIPTORORO

38	PETER RONO	24685628	0729868920	CHEPKOBOROT	KIPTORORO
39	KIPSIGEI KIGET	7130645		CHEPKOBOROT	KIPTORORO
40	KIPKORIR MUSSI	2319583		CHEPKOBOROT	KIPTORORO
41	ABIGALE CHEPKOECH	29606374	07187571224	CHEPKOBOROT	KIPTORORO
42	PETER TIROP	20029019	0723624150	CHEPKOBOROT	KIPTORORO
45	HENRY CHIRCHIR	13023189	0724467940	TIRITYA	
46	CHARLES ROTICH	31160573	0708828412		
47	WESLEY RONO	25424220	0712266831		
48	DAVID LABOSO	9833620	9833620	CHEPKOBOROT	
49	JEREMIAH TERER	206026	0722651342		
50	CHEPKWONY CHUMO				
51	EMILY LABOSO		0729599414		
52	DAVID SEREM	20051701	0726736271		
53	HILLARY RUTO	30565524	0720622900		
54	JOSEPH RUTO	10194714	070863020		
55	DANIEL MARTIM	7131195	070233453		
56	LANGAT VINCENT	24877986	0717121805		
57	PATRICK YEGON	24744979	0722616211	KIPTONGOT	
58	DAVID SIGILAH	3875466	0707734988	NDOINET	
59	ARAP NGEMU	10314202	0710519356	BANGENA	
60	BESON TOWETT	26389223	0718763332	NDEFU	
61	ERICK TOO	12743835	07264541645	KIPSATA	
62	PHILIP BII	4741699		KIPSATA	KIPTORORO
63	JOHN CHEPKWONY	20726022	0700619448	NDONNET	KIPTORORO
64	PAUL KORIR	11525240	0723687328	KIPTONGOT	TINET
65	JOSEPH M A BIWOOT	1771092	0722572394	CHEPKABUROT	CHEMATICH
66	JACKSON KIPROTICH	13103884	0728271299	KIPTENDEN	KABONGOI
67	DAVID KIBETCHIR	9712943			
68	GEOFREY KIRUI	32600809	0702210579	KIPTORORO	CHEMORE
69	JOHN KIMAIWA	24230592	0715945217	TAITA	KABONGOI
70	SAMWEL KIPLANGAT	11718567	0721216006	NDOINET	KIPTORORO
71	PHILIP KIPKEMBOI	24230592	0728034356	KABOISYO	KAMWAORA
72	ALFRED KIMTAI KOECH	24517171	0707728575	KIPTORORO	KIPTORORO
73	PHILIP O CHERUIYOT	3009256	0710930509	CHEPKOBOROT	KIPTORORO
74	RICHARD KIPKEMOI	3835300	0726452430	CHEPKOBOROT	KIPTORORO
75	JANE CHEMRER CHEMISET	242865		CHENUKU	KABONGOI
76	DAVID SAMOEI	20664293	0714417104	KIPTORORO	KIPTORORO
77	FREDRICK KIPKORIR KOSKEI	4758305	0711793906	KIPSAPTA	KIPTORORO
78	DAVID KIPKORIR NGENO	25391445		KIPTORORO	KIPTORORO
79	RICHARD TEREA	23942949	0728482404	TUMUIYOT	KIPTORORO

80	PATRICK CHEPKWONY	29359025	0724882199	KIPTENDEN	KIPTORORO
81	GEOFFREY ROTICH	26999476	0703871156	KIPTORORO	KIPTORORO
82	JOHANA KIPKOECH	3861239	0737875604	KIPTENDEN	KABONGOI
83	FRANCIS KIPKIRUI TONUS	1364238	0721930898	KIPTENDEN	KIPTORORO
84	JOHN KIPNGENO ROTICH	12800281	0726220287	KIPTENDEN	KIPTORORO
85	WINNY CHELANGAT	31510216	0702745374	SACHANGWAN	KIPTORORO
86	SIGEI BEATRICE	29206741	0707710642	KIPTENDEN	TINET
87	PAULINE CHEPKIRUI BUTUK	20139356		KIPTENDEN	TINET
88	EMILY SOI	28643795	0708630887	NDOINET	TINET
89	SHARON C KOECH	2601945	0702876726	NDOINET	TINET
90	JANE C RUGUT	11715775	0703706769	NDOINET	TINET
91	JOYCE CHEMTAI	25713415	07019354741	KIPTENDEN	TINET
92	JANE BOARE	20452084	0711150095	KIPTENDEN	TINET
93	JULIANA CHEBET BILIACHA	4286446	0703235594	CHEPKOBOROT	KIPTORORO
94	NANCY LAGAT	9708992	0703235594	CHEPKOBOROT	KIPTORORO
95	JOYCE BETT	7960544	0706796031	CHEPKOBOROT	KIPTORORO
96	ROSE CHEBET	28780310	0719354691	CHEPKOBOROT	KIPTORORO
97	JAPHET KIPLANGAT TANUI	25633941	0713394691	CHEPKOBOROT	KIPTORORO
98	GRACE CHEROTICH KOSKEI	3827301		CHEPKOBOROT	KIPTORORO
99	JANIFFER CHEMWETICH	10770884	0721215873	CHEPKOBOROT	KIPTORORO
100	IRENE CHEBET	11717026	0706431920	CHEPKOBOROT	KIPTORORO
101	ELIZABETH C CHERUIYOT	5997637	0716814489	CHEPKOBOROT	KIPTORORO
102	CAROLINE C CHERUIYOT	27665128	0723385819	CHEPKOBOROT	KIPTORORO
103	CAROLINE CHEPNGENO	29818858	0702692772	KAPBOISLO	TINET
104	JACKLINE KERICH	26101323	0714770659	TAITA	TINET
105	PHILIP CHEPKELAT	0470840	0724106136	KAPSONGOP	CHEMATICH
106	SAMWEL MUTAI	8020390	0729918825	BARTAGATET	CHEMATICH
107	PAUL KIMTET LANGAT	2421419		KIPSENGENI	
108	VINCENT RUTO	24108197	0721575675	KAPSONGOP	
109	ALICE CHEPKORIR	7624886	0715868398	SACHANGWAN	
110	BENJAMIN KEMBOI	11864529	0721916186	CHEPKOTOROT	CHEMATICH
111	PAUL KIPLAGAT YEGON	11115648	0715868398	SACHANGWAN	CHEMATICH

112	ROBERT KIBET	30155691	0718263805	NDOINET	CHEMATICH
113	PAULINE CHEPTOO	33098189	0715868398	NDOIMET	CHEMATICH
114	KIPKEMOI KIRINGET	0857062		SACHANGWAN	CHEMATICH
115	LEAH CHEBET SAMBU	13020243		KAPSONGOP	KIPTORORO
116	GILBERT KIBET CHERUIYOT	32527023	0718451148	KAPSONGOP	KIPTORORO
117	RICHARD KOECH MUTAI	70265099		KAPSONGOP	KIPTORORO
118	EMILY CHEBET	207217533		CHEPKOROBOT	KIPTORORO
119	SUSAN CHEROH	22969689	0725075293	CHENUGU	TINET
120	ALICE CHEPKOECH SIELE	11115613		CHENUGU	TINET
121	JULIANE CHEPKEMO	7960663	0703940664	CHEPKOROBOT	KIPTORORO
122	JANE CHEBET	10892571	07197222029	CHEPKOROBOT	KIPTORORO
123	BENINER CHEPKOECH	20654925	0726152290	CHEPKOROBOT	KIPTORORO
124	NICHOLAS KIPLAGAT	28803537	0727822912	KAPSONGOP	KIPTORORO
125	NANCY CHEPTOO RUTO	11346080		CHENUGU	TINET
126	KIPLAGAT NGENO	29056997	0723385666	CHEPKOROBOT	CHEMATICH
127	JUDY CHEPKOECH	28745550	0716185632	CHEPKOBOROT	CHEMATICH
128	GLADYS CHEPNGETICH	32584941	0729699020	CHEPKOROBOT	CHEPKOROBOT
129	EVALINE MARITIM	20497139		KIPTENDEN	TINET
130	ANN KOSGEI	7994960	0720625844	KIPTENDEN	TINET
131	JANETH CHELANGAT	12556733		NDOINET	CHEPKOROBOT
132	RUTH CHEPKORIR	6015020		SACHANGWAN	CHEMATICH
133	JANETH CHELANGAT	21159270		CHEPKOBOROT	CHEMATICH
134	JANETH CHEPNGENO	1170763	0702790614	CHEPKOBOROT	CHEMATICH
135	JANETH CHEBET	11618046		NDOINET	CHEMATICH
136	JOYCE CHEPKEMOI	30187503	0708588476	KIPTENDEN	TINET
137	ALICE CHELANGAT TARE	5232698	0728557259	CHEPKOBOROT	CHEMATICH
138	LINAH CHEPTOO	13546507	0702372242	CHEPKOBOROT	CHEMATICH
139	BEATRICE CHEPWAGEN	23164819	0724550078	CHEPKOBOROT	CHEMATICH
140	PAULO KIPKEMOI MTEI	7656058		CHEPKOBOROT	CHEMATICH
141	RACHEL CHEPNGEMO	13123790		CHEPKOBOROT	CHEMATICH
142	SELLY KIPKEMOI	1743844		CHEPKOBOROT	CHEMATICH
143	JOYCE CHEPKEMOI	25546646		CHEPKOBOROT	CHEMATICH
144	RUTH CHEROTICH SOI	8070634	0706655047	NDOINET	CHEMATICH
145	JEREMIAH SOI	0326996	0714025887	SACHANGWAN	KIPTORORO

146	CHELANGAT MILKER	3296360	0703862294	SACHANGWAN	KIPTORORO
147	DENIS NGENO	29310000	0714116541	NDOINET	KIPTORORO
148	WILSON MUTAI	20233979	0713430112	CHEPKOBOROT	KIPTORORO
149	TYSON KIBET KORIR	12920302	0727965209	SACHANGWAN	KIPTORORO
150	CHARLES KIRUI	23434537	0715234420	KAPSONGOP	KIPTORORO
151	RICHARD KERING	5220457	0728524785	TIRITA	KIPTORORO
152	WESLEY KIPKORIR	24441632	07182666079	SACHANGWAN	KIPTORORO
153	RUTH CHEPNGENO	11799538 6	0710666209	KIPTENDEN	KIPTORORO
154	AGNES CHERUIYOT	11115959	0703227166	CHEVUKU	TINET
155	KENETH KORIR	33447259	0701107523	KIPLONGON	KIPTORORO
156	HILARY KIPYEGON	25630968	0718284492	TIRITA	KIPTORORO
157	REUBEN ROREN	5222596	0717031029	CHOWUKU	TINET
158	MARTIN KIPLANGAT	31099506	0703862294	SACHANGWAN	KIPTORORO
159	NELLY CHEPKIRUI	26991785	0707425311	CHEPKOBOROT	KIPTORORO
160	MERCY CHEPKEMU	20904764	0713065739	CHENUKU	KIPTORORO
161	JANETH CHEPKERUI	13171824	0728557259	KIPSAPTA	KIPTORORO
162	ANJELINE	9371870	0723959772	CHEPKOBOROT	KIPTORORO
163	EMANNUEL KIPRONO	28383131	0716881268	KAPSONGOP	KIPTORORO
164	ROTICH AFRED	22578793	0712407069	KAPSONGOP	KIPTORORO
165	MARTA CHERONO	11528195	0728655726	CHEPKOBOROT	KIPTORORO
166	ELEN NGWENO	12782342	0707207598	CHENUGU	TINET
167	MARK KUGO RONO	2346172		CHEPKOBOROT	KIPTORORO
168	JAMARY CHEPKIRUI	21374475	0711982103	KIPSEGEM	KIPTORORO
169	CAROLINE CHEPKEMOI	26815881	0711605337	CHENUGU	KABANGOI
170	ROSALINE CHEPKORIR	9832457	0704586699	CHENUGU	KABANGOI
171	ISAIAH KIPRONO	23954288		CHEPKOBOROT	KABANGOI
172	JANE CHELANGAT	20217350	0707085892	CHENUGU	KABANGOI
173	CATHERINE CHEPKORIR	5232967	0700422655	CHEPKOBOROT	KIPTORORO
174	HANNA CHEPKIRUI	20393960	0723804328	KIPTORORO	KIPTORORO
175	ROSE CHEPKEMOI	21748342	0721339326	KIPTORORO	KIPTORORO
178	BENJAMIN K SOWE	3532521	0725974523	KIPTORORO	KIPTORORO
179	JACKLINE LANGAT	24840121	072760030		
180	DUNCAN RONO	21335606	0720531804	TINET	TINET
181	DAVID KORIR	9714553	0722269352	TINET	TINET
182	STEPHEN K SINGOE	13441165	072887969	TINET	TINET
183	DAUDI K RUTO	127430	0723298150	KIPTORORO	KIPTORORO
184	EMILY CHEBET	3307404	0701073646	KAPSOKOP	
185	ERICK KIPNGENO	21840276	0715450551	KAPSONGOP	
186	DENIS KIRUI	26936760	0722932251	KAPSONGOP	
187	RACHEL KORIR	4286130	0706093235	SACHANWAN	

188	CAROLINE CHELANGAT	32195736	0701620860	KIPSAPTA	
189	PAUL MUTAI	21256834	0723031481	KIPLONGON	
190	NELSON KARIR	20062688	0700721343	TINET	
191	KIRUI KIPKOECH	21364303	0710362368		TINET
192	KIMTAI A ROTICH	32227137	0705227244	TIRITA	KIPTORORO
193	BARTUYOT KIPLAGAT	4559647	0702745374	KIPSAPTA	KIPTORORO
194	JANET CHEMTAI	9640154	0729699366	CHEPKOBOROT	KIPTORORO
195	JANE CHEPKOSGEI	11718170	0729358091	KAPSONGOP	KIPTORORO
196	PHILIMON MUTAI	24345127	0705656515	KIPLONGONY	KIPTORORO
197	LANGAT JOHN	21275415	0710976675	SACHANGWAN	KIPTORORO
198	SARAH CHEPKORIR	1331183	0733121460	NDOINET	CHEMATICH
199	JOYCE CHEMTAI	46482488	0717521339	NDERU	CHEMATICH
200	SUSAN CHEPKIMUTAI	11826452	0703862294	SACHANGWAN	CHEMATICH
201	SAMWEL KIMUTAI	3872992	0715295317	KAPSONGOP	CHEMATICH
202	KIPROTICH ROBERT	212821121	0719327666	KIPLONGONY	KIPTORORO
203	NICHOLAS BARCHOU	14439064		CHEPKOROBOT	KIPTORORO
204	CORNELIUS MUTAI	5222094		CHEPKOROBOT	KIPTORORO
205	SAMWEL CHERUIYOT	12803211	0718141492	CHEPKOROBOT	KIPTORORO
206	NICHOLAS LANGAT	33536384		CHEPKOROBOT	KIPTORORO
207	JOEL K LANGAT	17432360	0726728443	CHEPKOROBOT	KIPTORORO
208	FRANCIS KORIR	7063377	0720475466	CHEPKOROBOT	KIPTORORO
209	ALEXANDER LANGAT	5584154	0712971533	CHEPKOROBOT	KIPTORORO
210	KIPNGENO ARAP CHIRCHIR	11718513		CHEPKOROBOT	KIPTORORO
211	GEOFREY KIPLANGAT	11406816		CHEPKOROBOT	KIPTORORO
212	JACKSON RUTO	23088976	0726558359	CHEPKOROBOT	KIPTORORO
213	WESLEY KIGEN	0869728		CHEPKOROBOT	KIPTORORO
214	STEPHEN BARIMEN	13621139		CHEPKOROBOT	KIPTORORO
215	PATRIK RONO	11298691		CHEPKOROBOT	KIPTORORO
216	WILSON KIBET RUTO	23416037	0713776832	CHEPKOROBOT	KIPTORORO
217	SAMMY KISPSIGEI			CHEPKOROBOT	KIPTORORO
218	PHILIP LANGAT	25008582		CHEPKOROBOT	KIPTORORO
219	DAVID KIKWAI KIPROTICH	23920114	0710646585	CHEPKOROBOT	KIPTORORO
220	DAVID KAPNGENO MUTAI	1774110		CHEPKOROBOT	KIPTORORO
221	BENARD KIMTAI SANG	27193907	0708291621	CHEPKOROBOT	KIPTORORO
222	DAVID BETT	4759487		CHEPKOROBOT	KIPTORORO
223	BENINNY RONO RUTO	4259921	0722972746	CHEPKOBOROT	KIPTORORO
224	CHRISTOPHER LANGAT	11718559	0720692718	KADONGOT	KIPTORORO
225	RICHARD KIPKORIR	9729459	0721795865	NDOINET	TINET

226	DAVID KOECH	0198407	0717493244	NDOINET	KIPTORORO
227	JULIUS KOMINGOI	2543641	071247911	KIPSAPTA	KIPTORORO
228	CHARLES ROTICH	1750467	0703684553	CHEPKOBOROT	KIPTORORO
229	ISMAEL KOECH	20653028	0728533768	KIPLONGONY	KIPTORORO
230	DAVIN CHEPKWONY	28594151	0723078694	TICOA	KIPTORORO
231	KIPKETER ARAPSOI	11637104		KIPLONGONY	KIPTORORO
232	PAUL KIKWAI	9370400	0707233497	TAITA	TINET
233	VINCENT BII	12784723	0710462825	SACHANGWAN	KIPTORORO
234	STEPHEN TANUI	6007998		SACHANGWAN	KIPTORORO
235	LUCY CHEPKOECH	7104347		CHEMANER	TINET
236	TAPRANDICH C KIMTAI	4287196		CHEPKOBOROT	KIPTORORO
237	SARAH CHEKIRUI SEREM	4408943		CHEPKOBOROT	KIPTORORO
238	EVALINE C KOECH	12834481	0719057855	CHEPKOBOROT	KIPTORORO
239	NANCY CHERONO SUKUT	12783547	0715164431	CHEMANER	TINET
240	ALICE CHEBET TEMBECH	8949059	0716977973	KIPTENDEN	TINET
241	VICKY CHELANGAT	28694268	0701971360	KIPTENDEN	TINET
242	WINNY RONO	25580574	0716430679	KIPTENDEN	TINET
243	ANNAH CHELANGAT	8659073		CHEPKOBOROT	CHEPMATICH
244	EMILY CHEBET ROTO	20654893		CHEPKOBOROT	CHEPMATICH
245	STELLA CHELANGAT	27809537		CHEPKOBOROT	CHEPMATICH
246	BETTY CEHPKIRUI	23065415	0707745374	CHEPKOBOROT	CHEPMATICH
247	ALICE CHELANGAT	7227881		CHEPKOBOROT	CHEPMATICH
248	JACLINE CHEPKORIR	13669959	0700356861	CHEPKOBOROT	CHEPMATICH
249	JOSEPH KIPRONO	308168844		CHEPKOBOROT	CHEPMATICH
250	NANCY CHEPKIRUI	2409219		NDOMET	
251	SOFIA CHERONO	12784000		NDOMET	
252	TABITHA CHEMUTAI	22822669	0700787651	CHEPKOBOROT	CHEPMATICH
253	ANNAH CHEPCHIRCHIR	12742571	0706460501	NDOINET	CHEPMATICH
254	MAGRET CHERONO	1170711		NDOINET	CHEPMATICH
255	LUCY KEMOI	31395356		NDOINET	CHEPMATICH

256	EMILY CHERONO	11115281		BORON	KAMWAIRA
257	EDDY C SOI	13129781	0721950429	CHEPKOBOROT	CHEMATICH
258	RAELY CHEPKIRUI TELOT	3875927		CHEPKOBOROT	KIPTORORO
259	ANNA CHEPKORIR	6014515		CHEPKOBOROT	KIPTORORO
260	GRACE CHELANGAT	2350577		SACHANGWAN	KIPTORORO
261	BORNES CHERONO	1740125		NDOINET	KIPTORORO
262	ZACHAUS KIPNGETICH	7629378	0725751015	NDOINET	KIPTORORO
263	HARON M ASANYO	7223256	0711813146	KABONGOI	TENET
264	FRANCIS MUNGOTSOI	8750810	0726072377	CHEPTANGUN	CHEPTANGUN
265	BIOGEN CHEPNGEN	12743929	0714147064	CHEPKOBOROT	KATORORO
266	JULIUS LANGAT	21123376	0719100818	CHEPKOBOROT	KIPTORORO
267	ZACHARIAH MOGOAH	20535755	0721216273	SITOITO	TINET
268	GITERI OGOT JIMLAVES	24627611	0728857611	KAMWAURA	KIPTORORO
269	DAVID SITIENET	0852052	0725332898	TINET	TINET
270	SAMMY	202290435			TINET
271	CHRISTOPHER		0727137485		
272	PAUL CHEPKWONY	7082156	0728858099	TINET	TINET
273	ALICE B MAGAATI	25635605	0712748610	TINET	TINET
274	ANTHONY M WAWERU	20405898	0720267832	TINET	TINET
275	KIPKOSGEI MUTAI	13104202	0720363414	TINET	TINET
276	EZEKIEL KIPLANGAT	0869231	0712840687	TINET	TINET
277	KOECH MOSES	23706530	0725208541	CHEPTAGUM	TEMYOTTA
288	PAUL KIPYEGEON	20059788	0725075316	KABONGOI	TINET
289	LONNER CHEPKIRUI	26991929	0724302016	CHEPKOBOROT	TINET
290	KIPROTICH TUEI LEONARD	29640331	0718871429	NDOINET	KIPTORORO
291	GRACE CHEMTA PUNGUS	4277553	072689085	NDOINET	KIPTORORO
292	LILY C SOI	11618198	0721578040	CHEPKOBOROT	KIPTORORO
293	CHARLES K NGENO	23487682	0719531690	CHEPKOBOROT	KIPTORORO
294	SARAH C CHERUIYOT	33216040	0725679392	NDOINET	TINET
295	CHRISTINA C SIGEI	8021180	0724544602	NDOINET	TINET
296	SHARON CHERU	25963152	0712871216	CHEPKOBOROT	KIPTORORO
297	STELLAH CHEPWOGEN	20927363	0701628285	CHEPKOBOROT	KIPTORORO
298	JONATHAN K SITIENEI	2411141	0711282217	NDOINET	TINET
299	JANE CHEBET	10935883	0715843248	KIPTONGOTON	TINET
300	GRACE C TANUI	4743121	0726153965		KIPTORORO
301	ALICE C SARON	11618029	6715209301	NDOINET	KIPTORORO

302	JANE CHUMA	33740850	0737070550	NDOINET	KIPTORORO
303	REBECCA C TESOT	6466386	070708592	CHEMATICH	KIPTORORO
304	CHRISTINE C BOWEN	12745873	0711359706	NDOINET	KIPTORORO
305	ESTHER C TEMKE	387634707	0729658255	NDOINET	KIPTORORO
306	RICHARD K BIRIR			KIPSABTA	KIPTORORO
307	ROSALINE C TEMKE	1167104		NDOINET	KIPTORORO
308	SAFINAH C MAINA	6021440	0700176856	CHEMATICH	KIPTORORO
309	IRENE C CHEPKWONY	2029267	0729985507	NDOINET	KIPTORORO
310	ALICE C CHEPKWONY	1337398	0716176523	NDOINET	KIPTORORO
311	ELIJAH K RONO	11430626	0712249808	CHEPKOBOROT	KIPTORORO
312	ESTHER C CHELULE	6019371	0717528463	NDOINET	KIPTORORO
313	GEOFFEREY K TANUI	27202525	0711387010	NDOINET	KIPTORORO
314	ROBERT C KOTEL	26346276	0704833853		
315	WESLEY K KIGEN	23088976	070013505	CHEPKOBOROT	KIPTORORO
316	FLOMENA CHEPKEMOI	37392157	0702210457	CHEMATICH	KIPTORORO
317	ROSE CHELANGAT	12934647	070719261	KIPSAPTA	KIPTORORO
318	RACHEL MARITIM	4746671		BARKATALIET	KIPTORORO
319	ANDERSON K KIPRONO	12923118	0719453788	CHEBUIYET	KIPTORORO
320	BEATRICE CHEBET	27560316	0704142942	CHEPKOBOROT	KIPTORORO
321	LEONARD C KIRUI	20243762	0726480506	CHEPKOBOROT	KIPTORORO
322	LILY CHEPAYENO				
323	RECHO C KOECH	2412511		CHEPKOBOROT	KIPTORORO
324	WESLEY NGETICH	28248618		TIMTAT	
325	ANNA C ROTICH	11718238	0706674082	KIMUSWON	KIPTPOR
326	ALBIN K SANG	3841806	0712584393	TAITA	TINET
327	STENDLY K KOSGEI	20947127	0704032975	TAITA	TINET
328	GEOFREY KIPLANGAT	9557919	0711490073	TAITA	TINET
329	TAPSABEI C MITEI	2348592	0710418930	KURES	CHEMARE
330	IRINE C MERGERER	11115589	0706888696	KIPKORIS	KIPTORORO
331	MARY C MARITIM	12327981	0712872358	KIPSEKEM	CHEMATICH
332	BENJAMIN K CHEPKWO	32391188	0718153284	TAITA	TINET
333	SCOLAR CHEPKOECH	31537796	0714584493	KAPSONGOP	KIPTORORO
334	CHRISTINA C KOECH	33077542		KAPSOSNGOP	KIPTORORO
335	KIPKEMOI A TUWE	0856441	0718971955	KABONGOI	TINET
336	BENARD KORIR	32167553	0711244486	KIPKORIS	KIPTORORO
337	BENARD K KIRUI	33533791	0712902231	KABONGOI	TINET
338	RAEL C CHEMOIWO	0587110		CHEPKABOTO	KIPTORORO
339	ZEDDY C CHEKOSIOM	3841974		TAITA	TINET
340	BEATRICE C SANG	30895480	0712584393	TAITA	TINET
341	RICHARD K BORE	10991448	0717821955	KIPTORORO	CHEPKOBOROT

342	KIPRONO A SIGIRA	1777245		KAPSONGOK	KIPTORORO	
343	ELIJAH K YEGON	27783751		KAPSONGOP	CHEPKOBOROT	KIPTORORO
344	JOSEPH GITAMO	25994354	0728942414	KARIBA	CHEMANOR	
345	WILLIAM TOBON	2346133	0711157543	NDOINET	KIPTORORO	
346	KENETH KEINO	23896273	0710488824	KARIBA		
347	KIPROTICH TUEI LEONARD	29640331	0718871429	NDOINET	CHEMATICH	
348	BENJAMIN C TOO	22902661	0725995972	KAPSAPTA	KIPTORORO	
349	DAVID KIPRONO BORE	11432030	0720608788	KORABORIET	KIPTORORO	
350	SIMON KIPKERINA	3851174		CHEPKOBOROT	NDOINET	
351	BETTY CHERONO	31864558	0712560122	NDOINET	NDOINET	
352	ALICE CHEPKEMOI	11466311	0705589569	TINET	TINET	
353	ROSALINE CHEPKEMOI	11369474	070533618	TINET	TINET	
354	REBECCA CHEPKIRUI	12834217	0723783734	TINET	TINET	
355	DEVID TANUI	13340955	07121347	NDOINET	KIPTORORO	
356	PAUL KIPLKIRUI MUTAI	21256821	0723131481	KAPSONGOP	KIPTORORO	
357	ANNAH CHEMTAI	9886879		CHEPKOBOROT	KIPTORORO	
358	JOHN CHERUIYOT	12744073		KIPKORIS	KIPTORORO	
359	RUBEN TOMEI	1087776	071468314	NDOMET	KIPTORORO	
360	DISMAY KIPSANG BET	28660452	0706655756	NDOMET	KIPTORORO	
361	PHILIMON KINGENO KIRUI	27775676	0790896088	CHEPKOBOROT	KIPTORORO	
362	ALICE CHEPKEMOI TUIYA	12783231	0710864210	CHENUGU	KABONGOI	
363	LILIAN CHEPKIRUI	20332558	0715385229	KAMOCHOIMET	KABONGOI	
364	ESTHER CHERONO	2348776	0715385229	KAMOCHOIMET	KABANGOI	
365	ANNA SITONIK	11718976	0715952038	CHEPKOBOROT	KIPTORORO	
366	ZEDDY CHEPKORIE	2414375		CHEPKOBOROT	KIPTORORO	
367	HELLEN CHEMUTAI	5453910	0708289964	CHEPKOBOROT	KIPTORORO	
368	BETTY CHEPKEMOI BETT	21857241	0701103511	CHEPKOBOROT	KIPTORORO	
369	CAREN CHEPKORIR	28672706	0710342220	CHEPKOBOROT	KIPTORORO	
370	ALICE KORIR	9640036	0710751433	KIPTENEDEN	KABONGOI	
371	MARY ROTICH	33228333		KIPTENEDEN	KABONGOI	
372	CLARA CHELANGAT	12796995	0703141414	CHENUGU	KABONGOI	
373	JANETH CHEPNGETICH	7132483	0707735183	CHENUGU	KABONGOI	
374	MARY C BORE	12837076	0704471637	CHENUGU	KABANGOI	
375	JACKLIN SANG	31145639	0701476118	CHEPKOBOROT	KIPTORORO	
376	LEAH CHEPKEMOI SANG	13379404	0722815589	CHEPKOBOROT	KIPTORORO	

377	ESTHER CHEPNGENO	2348765	0729652025	CHEPKOBOROT	KIPTORORO
378	PETER KIPKIRUI	21811022		CHEPKOBOROT	KIPTORORO
379	BEATRICE CHEPKORIR	20688821	0729511583	CHEPKOBOROT	KIPTORORO
380	CHERUIYOT MUTAI	08722063		CHEPKOBOROT	KIPTORORO
381	EDNA CHEPKORIR	9370391	0702506881	CHENUGU	KABONGOI
382	ALICE C MNGEWI	1747401	0718147333	KIPLENDEA	KIPTORORO
383	SHARON CHEPKOECH	33752694	0719684783	KIPLENDEA	KIPLENDEA
384	HELLEN CHENSHO	31903637	0710382290	KIPLENDEN	KIPTORORO
385	RICHARD KOSGEI	5236833	0707735131	CHEROTO	KIPTORORO
386	SELLY CHEPKIRUI	7638424	0724817723	KIPLENDEN	KIPTORORO
387	PAULO SANG		0721157034	CHEPKOBOROT	KIPLENDEN
388	KIMISOI SANG	3318167	0707734974	CHEPKOBOROT	KIPTORORO
389	SHARON CHEBET	25031716	0713815792	CHEPKOBOROR T	KIPTORORO
390	AGNES CHELANGAT	11829684	0710964630	KIPTENDEN	KIPTORORO
391	WINNY CHEPMUTAI	29727661	0711755931	CHEPKOBOROT	KIPTORORO
392	ROBERT KIPNGENO	22374902	0710466282	CHEPKOBOROT	KIPTORORO
393	BETY KEMOI	21940453	0729092873	CHEPKOBOROT	KIPTORORO
394	LUCY CHEPKOECH	20035426	0728753750	CHEPKOBOROT	KIPTORORO
395	JOHN KIMTAI KORIR	3829319	0716237585	CHEPKOBOROT	KIPTORORO
396	KRISTINE RANGUEI	10949527	0707734914	CHEPKOBOROT	KIPTORORO
397	MARITIM KEROS	4758837	0710369266	CHEPKOBOROT	KIPTORORO
398	ALEXANDER KIPSANG	31142471	0701257547	CHEPKOBOROT	KIPTORORO
399	JOEL CHEBOSIT	32524178	0721542390	CHEPKOBOROT	KIPTORORO
400	BORRES CHEPNGENO	1111593		CHEPKOBOROT	KIPTORORO
401	ESTHER KOSGEI	2329050	0724809024	CHEPKOBOROT	KIPTORORO
402	HESBON OKARI	24452696	0723728149	NAIROBI	NAIROBI
403	JOHN MUYAI	983326	0722336862	CHEPKOBOROT	KIPTORORO
404	ENG. MARK GWENA	8745128	0722459444	NAIROBI	NAIROBI
405	LYDIA N GATHUKU	11128429	0721607645	SONDU MIRIU	SONDU MIRIU
406	WILLIS O OCHIENG	11611119	0722861707	NAIROBI	NAIROBI
407	JOHN KOECH	5276924	0703461118	CHEPKOBOROT	KIPTORORO
408	MICHAEL SANGUER	8897706	0722977397	ITARE DAM	KIPTORORO
409	LEONARD SANG	24013095	0710364834	TINET	TINET
410	RICHARD K	10382385	0727209424	NDOINET	KIPTORORO
411	STEPHEN K LABOSO	8546538	0727856516	CHEPKOBOROT	KIPTORORO
412	SIMON BETT	12837210	0720252433	CHEPKOBOROT	KIPTORORO
413	SAMMY CHEPKWONY	1746038	0729804730	CHEPKOBOROT	KIPTORORO
414	NEWTON KIRUI	8547869	0720019240	CHEPKOBOROT	KIPTORORO
415	WILSON ROTICH	1364893	0711271804	SACHANGWAN	KIPTORORO
416	CORNELIUS K SANG	9726153	0724683513	NDOINET	KIPTORORO
417	PAVI K MABWAI	12980259	0726296918	KAPSATA	KIPTORORO
418	PHILIP TOO	23667191	0727499017	CHEPKOBOROT	KIPTORORO

419	SOLOM K MAGUTI	11605517	0722492693	CHEPKOBOROT	KIPTORORO
420	CHRISTOPHER K KORIR	24552551	0714083141	SACHANGWAN	KIPTORORO
421	ROBERT K LANGAT	23824019	0724807485	NDOINET	KAPTORORO

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: T-WORKS **DATE:** 11-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	NYABUTI BRIAN	27906578	0727133880	BONDENI	BONDENI	
2	BEULAH JEPNGETICH	27484985	0728629666	BONDENI	BONDENI	
3	REGISTO KOIKAI	9175231	0714265459	BONDENI	BONDENI	
4	OMETO ELIJAH	0638602	0710330450	MERERO MT/WKS	MILIMANI	
5	GEORGE KINANGA	10082764	0720593450	MERERO MT/WKS	MILIMANI	
6	Mahendra Shah	189074	0733632875	Milimani	Milimani	
7	JOHN K. KIBIRIITO		0722-746883	Milimani	Milimani	
8	BENSAMIN BIRGEN	6420110	0722704580	Milimani	Milimani	
9	PATRICK MATINDI	11615468	0722769113	Milimani	Milimani	
10	EMONDE PATRICK	11047647	0721798704	MERERO MT WORKS	MILIMANI	
11	ANNE RAKWACH	1812115	0721373550	MILIMANI	MARAGOLI	
CHEF — 12	JOEL ATUTI	8345303	0714-699777	MILIMANI	Milimani	
13	SAMUEL KANYO Rc	3052107	0721 254000	MILIMANI	MILIMANI	
14	NOAH A. BARASA	0330845	0723340341	MILIMANI	MILIMANI	
15	DAVID KAGE	9565760	0722 355578	KOLMANGE	KOLMANGE	
16	ANNASIASIAH W. GITAU	8443382	0722793312	KIAMUMU	KIAMUMU	
17	DURITY CHEROTICH	23161020	0720 ENA266	RACE COURSE		
18	Lynett Izima	22083836	0721 556199	Kiamumu	Kiamumu	
19	Lily Ngatia	0733130	0722425393	RVWSB	milimani	
20	Hesbon Okari					

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: KELELWET DATE: 11-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	GLADYS C. ORWASA	10195225	0722498813	KIPTENDEN	BARUT	[signature]
2	CHERUIYOT KANGOGO	11379107	0723233681	BARUT WARD	(ADMINISTRATOR)	[signature]
3	HESBON OKARI	24452696	0723728149	NAIROBI	NAIROBI	[signature]
4	Dr. Zablon Oonge	6412436	0733750231	NAIROBI	NAIROBI	[signature]
5	Eng. Mark Gwena	8745128	0722459444	NAIROBI	NAIROBI	[signature]
6	Rasna A. Abraham	5559556	0727179503	Kapkures	Kapkures	[signature]
7	EVANS KERING	20171740	0721619997	LALWET	KAPKURES	[signature]
8	THOMAS KIBET B.	22623935	0723443366	LALWET	KAPKURES	[signature]
9	JACOB SIGILAI	13171545	0724145804	BARUT	BARUT	[signature]
10	Joel K. Ngeretich	0990612	0725460165	Barut	Barut	[signature]
11	Eric Langat	11166773	0771087763	LALWET	Barut	[signature]
12	David ROTICH	12835626	0724262505	ANGOBOR	Kapkures	[signature]
13	LAWRENCE KISOI	23338888	0734032267	LALWET	KAPKURES	[signature]
14	SAMSON KOSKE	0512361	0720548695	KAPKWEN	BARUT	[signature]
15	SALLY C LANGA	1767776	0722423791	INGOBOR	KAPKURES	[signature]
16	DANIEL K CHESIMET	0441534	0721-411062	KELELWET	BARUT	[signature]
17	JACOB SI					
18	Joseph Sigei	0746190	0727939065	KIGONOR	BARUT	[signature]
19	STANLEY NGENO	11715893	0720855540	LALWET.	KAPKURES	[signature]
20	JAMES ABUGA	~~0724723085~~ 1375099	0724723085	KELELWET	BARUT	[signature]

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: KELELWET **DATE:** 11-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	GLADYS C. ORWASA	10195205	0722498813	KAPTENDEN	BARUT	[signature]
2	CHERUIYOT KANGOGO	11379107	0723233681	BARUT WARD	(ADMINISTRATOR)	[signature]
3	HESBON OKARI	24452696	0723728149	NAIROBI	NAIROBI	[signature]
4	Dr. Zablon Oonge	6412436	0733750231	NAIROBI	NAIROBI	[signature]
5	Eng. Mark Gwena	8745128	0722459444	NAIROBI	NAIROBI	[signature]
6	Rasna A. Abraham	5559556	0727179503	Kapkures	Kapkures	[signature]
7	EVANS KERING	20171740	0721619997	LALWET	KAPKURES	[signature]
8	THOMAS KIRUI B.	22623935	0723443366	LALWET	KAPKURES	[signature]
9	JACOB SIGILAI	13171545	0724145804	BARUT	BARUT	[signature]
10	Joel K. Ngeretich	0990612	0725460165	Barut	Barut	[signature]
11	Eric langat	1116673	0771087763	LALWET	Barut	[signature]
12	David ROTICH	12835626	0724262505	NGOBON	KAPKURES	[signature]
13	LAWRENCE KISOI	23338888	0734082267	LALWET	KAPKURES	[signature]
14	SAMSON KOSKE	0512361	0720548695	KAPKWEN	BARUT	[signature]
15	SALLY C LANGA	1767776	0722423791	INGO BOR	KAPKURES	[signature]
16	DANIEL K CHESIMET	0441534	0721-411062	KELELWET	BARUT	[signature]
17	JACOB SI					
18	Joseph Sigei	0746190	0727939065	KIGONOR	BARUT	[signature]
19	STANLEY NGENO	1715893	0720855540	LALWET.	KAPKURES	[signature]
20	JAMES ABUGA	~~0729723085~~ 1375099	0729723095	KELELWET	BARUT	[signature]

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: KELELWET **DATE:** 11-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	SAMSON K. CHUMA	5976499	0721322360	MOGOON	KAPKURES	
2	LUCY J. KIPKOSGEI	12853034	0714880687	KELWET	KAPKURES	
3	JACOB K. RUTO	0324053	0722283888	Kiptenden	BARUT	
4	PST Joseph Tobon	7133609	0720371295	Lalwet	KAPKURES	
5	Daniel T. Tobon	3638081	0721291043	Lalwet	Kapkures	
6	SAMUEL K NGENO	0269001	0721818412	SOLMET	BARUT	
7	STEPHEN K. MARITIM	6244505	0722488338	SOLMET	BARUT	
8	RONOH J. KIPLANGAT	11715695	0727596032	Lalwet	Kapkures	
9	STANLEY NGENO	11715893	0720855540	Lalwet	Kapkures	
10	FRANCIS IC SIGEI	9815427	0720692747	BARUT	BARUT	
11	JOHNSON SIGEI	6618470	0724967579	LALWET	KIPKURES	
12	SAMUEL SOY	0873512	0710195202	Kigonor	Barut	
13	MOSES CHEPKWONY	2316178	0721423657	KELELWET	BARUT	
14	RICHARD K. SIGEI	20147058	0728051100.	KELELWET	BARUT	
15	Elijah K. Chumo	12439219	0715 952356	Lalwet	Kapkures	
16	David K. Langat	24644959	0720949997	Lalwet	Kapkures	
17	Wesley Kirui	33012301	0707021710	Lalwet	Kapkures	
18	JACOB M. RUTO	20752190	0721219594	TACHASIS	KAPKURES	
19	Jane maimbet	23157203	0727312892	Lalwet		
20	Josphin Langet	—	—	Lalwet		

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: KELELWET **DATE:** 11-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	Samy Rono	10658750	0714189845	Kelelwet	Barut	[illegible]
2	BOINET KIPKERICH	11806586	0722405548	Kelelwet	BARUT	[illegible]
3	Samwel Odero	7165854	0708958701	LALWET	BARUT	[illegible]
4	Samwuel Rono	—	0708696749	KELELWET	BARUT	[illegible]
5	Bernard Ruto	23679044	0710458181	"	Kelelwet	[illegible]
6	Bernard Tegon		0714837262	"	"	[illegible]
7	Charles Too	21828185	0726923936	Lalwet	Barut	[illegible]
8	Peter Koskei	20988620	0715849313	Lalwet	Barut	[illegible]
9	KENNEDY Kokey	28286486	0715320143	KELELWET	Barut	[illegible]
10	Thomas Langat	1062449	0712407984	KELELWET	Barut	[illegible]
11	CHARLES Koskei	22890621	0723606238	KELELWET	BARUT	[illegible]
12	Beatrice Koskei	21828185	0718683101	Lalwet	Barut	BK
13	Simon K. LANGAT	25699516	0707656958	Kelelwet	Barut	[illegible]
14	Peter K. Tanui	22639349	0724913472	Kiganor	Barut	[illegible]
15	BENSON M. MUKASA	23222980	0727823231	KELELWET	BARUT	[illegible]
16	BENJAMIN SANG	25534477	0728153030	KELELWET	BARUT	[illegible]
17	Stephen Ndondon	[illegible]	0720000919	Kamumundi	Kaplelach	[illegible]
18	MOSES JACKO MUKASA	24988626	0711428314	KELELWET	BARUT	[illegible]
19	Daniel K. Koskei	0865661	0718702797	Kelelwet	Barut	[illegible]
20	James G. Lochuch	10773215	0704330953	Kelelwet	Barut	[illegible]

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: KELELWET **DATE:** 11-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	JULIAH W. SULEMAN	10013646	0720385063	Kelelwet Sec	Baraut	
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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: RVWSB YARD **DATE:** 12-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	HESBON OKARI	24452696	0723728149	NAIROBI	NAIROBI	[signature]
2	Eng MARK GWENA	874512B	0722459444	NAIROBI	NAIROBI	[signature]
3	Dr Zablon Oonge	6412436	0733750231	NAIROBI	NAIROBI	[signature]
4	Eng. H. K. Chemiyot	11368364	0722824368	Nakuru	Nakuru	[signature]
5	A/CHIEF JOSEPH [illegible]	9934805	0723170696	LONDON	VIWANDA	[signature]
6	A/CHIEF JOEL ATUTI	8345303	0714699777	Milimani	MILIMANI	[signature]
7	DMK [illegible]	8809726	0720211618	LONDON	VIWANDA	[signature]
8	Alice W. Mwathi	1866[illegible]436	0720701223	Londoni	11	Wambui
9	HIRAM NYAGA NYAGAH	0990817	0724799160	Londoni	"	[signature]
10	Sinika Ompusi	1051123	0721-865082	London	Viwanda	[signature]
11	MAURICE RACO	2877164	0728518245	MILIMANI	NAKURU	[signature]
12	CAROLYNE WANJIKU	25626654	0729822831	London	London	[signature]
13	JOSEPH KING'ORI	0740819	0720039000	LONDON	LONDON	[signature]
14	Joel Koech	0304917	0721366908	London	Viwandani	[signature]
15	Francis Njoroge	25707426	0725370050	MCA London	Viwandani	[signature]
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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: RVWSB YARD **DATE:** 12-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	COLLINS OTUKHO	27718024	0710886052.	—	—	[signature]
2	FLORENCE MURIITHI	32096851	0703 830 322	SHABAB	NAKURU TOWN.	[signature]
3	PHYLLIS NG'ENDO	31010175	0716260339	SHABAB	NAKURU TOWN	[signature]
4	RICHARD WAWERU	3233018	0723896673	G.K PRISON	NAKURU	[signature]
5	Julius Kariuki	22955902	0707221261	LONDON	NAKURU	[signature]
6	Hellen M. Kamau	0084995	0720219995	Hilton	NAKURU	[signature]
7	MAURICE OLALO	2877164	0728518245	MILIMANI	NAKURU	[signature]
8	David Kigen	9865160	0722358518	SHABAB	Nakuru	[signature]
9	Yoshiko Sayama				Nakuru	[signature]
10	KEZIAH NDABA	22879645	0721232924	LONDON	NAKURU	[signature]
11	PETER KAIRU	12840257	0721412946	LONDON	VIWANDA	[signature]
12	Esther Nyambura	24795907	0724011676	LONDON	VIWANDA	[signature]
13	MAGDALENE GULARIRE	0864213	072498075	LONDON	VIWANDA	[signature]
14	Gladys G. Mudave	89777111	0721926721	London	Kiwandani	[signature]
15	JOACHIM SANTIAGO	13821090	0710396053	Soilo	VIWANDA	[signature]
16	JOSEPH NGATIA	29284394	0717723092	LONDON	VIWANDA	[signature]
17	CATHERINE MUCHUNU	0729085316	0729085316	RVWSB	London	[signature]
18	Grace Bowen	0722790008	10081894	RVWSB	London	[signature]
19	Peres Juma	8662767	0725671346	RVWSB	London	[signature]
20	SHEREF REHEMA		0715212182	RVWSB	NKR	[signature]

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: RVWSB YARD **DATE:** 12-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	BRIAN NYABUTI	27906578	0727133880.	BONDENI	BONDENI	[signature]
2	BEULAH JEPNGETICH	27484985	0728629666	BONDENI	BONDENI	[signature]
3	Joel Koech	0304917	0721366908	London	London.	[signature]
4	JOSEPH KINGORI	0740829	0720039000	LONDON	LONDON	[signature]
5	CAROL WANJIKU	25626654	0729822831	LONDON	LONDON	[signature]
6	Siriba Onyansi	10511123	0721-865082	London	London	[signature]
7	MAURICE OLALO	2877164	0702858245	MILIMANI	NJORO	[signature]
8	David Kiige	9865760	0722955518	SHABAB	SHABAB	[signature]
9	Nehemia Muriuki	1572374	0706420770	London	London	[signature]
10	SIMON MAINA	8622498	0726661942	K.M.C	LONDON	[signature]
11	Barney cheg	5507462	0722605406	RVWSB	MAJI PLAZA	[signature]
12	Leah Tanui	WR77399	0722569807	Rvwsb	Maji plaza	[signature]
13	Joseph Milgo	3505041	0726752515	RVWSB	Maji Plaza	[signature]
14	Gladys J. Mudane	9777111	0721926721	London	London	[signature]
15	JOSEPH NGATIA	29289394	0717723042	LONDON	LONDON	[signature]
16	CATHERINE Muchunu	10192888	0729-085316	RVWSB	London	[signature]
17	Kodosi Nashipae	31812843	0719361901	RVWSB	London	[signature]
18	Dawis Kimoros	24470396	0726857292	LONDON	LONDON	[signature]
19	Lilian Cherutumbo	11757121	0722601233	Olive Inn	Kiamunyi	[signature]
20	Asunda Joshua	32583802	0720805238	RVWSB	London	[signature]

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: RVWSB YARD **DATE:** 12-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	Lewis Tilahi	22501573	0721564631	Sec. 58	Sec. 58	
2	May Wanjohie	30940200	0722525087	Racecourse	Racecourse	
3	Jason Omwake	0328237	0721231202	Kiongororia	Green steds	
4	Lucy Mburu	7910389	0722576305	Kiamunyi	Kiamunyi	
5	Joseph Ngatia	29289394	0717723092	Kiwinda	London	
6	Elakim Wangi	3504104	0722861196	-	London	
7	Daniel Kiplagat	3048698	0718468026	-	-	
8	Caroline Chesono	32094261	0705325646	London	London	
9	Vincent Ingangi	13345338	0723886646	London	London	
10	Jared Mageto	25392052	0726695459	London	London	
11	Joseph K. Nyamunda	0869271	0722 863178	Bangladesh	Nwanda	
12	Joseph K. Rono	0568569	0720451097	Koinange	Shabab	
13	Samuel Sigei	0082595	0720000992	Koinange	Shabab	
14	Annastasiah W. Gitau	8443382	0722593316	Kiamunyi	London	
15	Reuben K. Korir	10511272	0722780537	Ngata	Ngata	
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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NGATA **DATE:** 12-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	SAMWEL YEGON	9815896	0722660157	OGILGEI	OGILGEI	[signature]
2	DAVID K KIRUI	3625485	0720451033	OGILGEI	OGILGEI	[signature]
3	EVANS ONGERI	9314392	0727777399	MERCY NJERI	KIAMUNYI	[signature]
4	LUCIA AKAI	12541461	0725608289	NGATA	NGATA	[signature]
5	William Kip Chumba	11378848	0721204353	Ngata	Ngata	[signature]
6	RUTH TINDI	11530444	0714284050	NGATA	NGATA	[signature]
7	BENARD OMWANDHO	27971923	0713977770	NGATA	NGATA	[signature]
8	DENNIS K NGENO	29835437	0700355515	Roret	Ngata	[signature]
9	COL(RTD) RAYMOND CHERUIYOT	0403078	0722772642	OGILGEI	OGILGEI	[signature]
10	MILLICENT C. KISOMBE	0981234	0707278283	RORET	NGATA	[signature]
11	ANNASTASIAH W. GITAU	8443382	0722593312	KIAMUNYI	LONDON	[signature]
12	Bernard Kurgat	22282277	0729502393	KAPKATET	NGATA	[signature]
13	KIRUI HILLARY	27670004	0710797621	Tulwet	NGATA	[signature]
14	Richard Sitienei	9163955	0724019392	Ogilgei	NGATA	[signature]
15	DOUGLAS YATOR	11841486	0726487771	Kiroban	Menengai west	[signature]
16	J. CHELANGA	0578085	071628981	Kiptendon	NGata	[signature]
17	Walter Ngelice Arurei	5307615	0721308454	Ngata	Ngata	[signature]
18	William Kosile	4291982	0720868015	Kiptenden	ngata	[signature]
19	DAVID K Koech	5976618	0721241374	Kiroban	NGATA	[signature]
20	Wilfred Morangi	1581261	0722601101	ngata sobea	MITI MOJA	[signature]
21	ELISAH NYABUTI	27401632	0723227820	Ngata sobea	MITI MOJA	[signature]
22	Benedict Shikani	10724780	0728420328	Kiroban	Kirobon	[signature]

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NGATA **DATE:** 12-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	DAVID ARAP BETT	1882614	0727927585	NGATA	NGATA	[signature]
2	SAMWEL CHERUTTOT	0844441	0729965213	TULWET	NGATA	[signature]
3	CHEBET REHEMA		0719472070	RVWSB	NKR	[signature]
4	Joshua Asunda		0720805238	RVWSB	NKR	[signature]
5	David Kuge		0722 358514	RVWSB	NKUR	[signature]
6	RICHARD KIRUI	10014976	0718646463	OGILGE	OGILGEI	[signature]
7	ALFRED K. CHERUIYOT	29580013	0717332918	KIROBON	NGATA	[signature]
8	SHEM Bosire	21756530	0713951663	Kirobon	NGATA	[signature]
9	Elijah K. Chelaite	07208521035	0730265	RORET		[signature]
10	Lazaro Kpech			RORET		
11	PAUL RUTTOH	2312210	0728384359	KAPTICH	MENENGAI	[signature]
12	PIUS K. A-chumo	0333K47	072177457	Tulwet	KIROBON	[signature]
13	BENJAMIN CHESULUT	3552147	0711164699	KAPTICH	Menengai	[signature]
14	SARAH C. KOSKEY	16093109	0722246926	KAPTICH	MENENGAI	[signature]
15	ELIMA KISOMBE	2312360	0728499567	RORET	NGATA	[signature]
16	Lina Rono		071868l048	Kirobon	Ngata	[signature]
17	JOYCE KORIR		0716259063	RORET	NGATA	[signature]
18	PHILIP SITIENEI	20579400	0724-691197	OLILLGI	OLILIGI	[signature]
19	CHERUON AMOSON			Ngata	KIROBON	
20	AMBROSE O. NGARE	2970776	0722956659	Ngata	Ngata	[signature]

21. HILLARY MOKUAI 13623466 0733559535 NGATA NGATA [signature]

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NGATA **DATE:** 12-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	Richard Chelule Rutto	20395834	0720-640978	OGILGEI	OGILGEI	
2	Alex Charle Onkoba	5846872	0721 211 804	Ngata	Ngata	
3	Sang Eliud Kiptoo	13622035	0722115115	~~Nartakiribun~~	Ngata	
4	Reuben K Korir	10511272	0722780537	Roret	Ngata	
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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: SACHANG'WAN **DATE:** 13-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	HESBON OKARI	24452696	0723728189	NAIROBI	NAIROBI	
2	RACHAEL MARU	13622345	0721586790	CHESOGET	KABIANGA	
3	Philip KiRui	13341127	0721492972	BOROP	SachangWan	
4	REV Jackson Anguza	23283558	0710661501	Kamug-	KABIANGA	
5	MCA Beatrice Nyawira	12745281	0722797827	MOLO	MOLO	
6	REV. JULIUS K. LANGAT	6606585	0724-619-243	SACHANGWAN	SACHANGWAN	
7	BERNARD KIBETT	22967472	0733852257	SACHANGWAN	SACHANG-WAN	
8	PAUL BIEGON	11718427	0722 683000	SACHANGWAN	MOLO	
9	James Kariuki	6667060	0706566223	Sachangwan	Sachangwan	
10	JOSEPH BII	13621900	0720 641515	MIGAA	MUKINYAI	
11	ELIZABETH NJERI MWANGI	20385914	0717470721	MIGAA	MUKINYAI	
12	ESTHER C. KENDUIYWA	11000976	0704150380	SACHANGWAN	SOIN	
13	JOSEPHINE N. NGIGE	3622651	0710645606	MUKINYAI	MUKINYAI	
14	Mary Nyangweso	7082478	0728948048	Sachangwan	Sachangwan	
15	JOSEPHINE CHEPKIRUI	6665792	0726292868	KABIANGA	KABIANGA	
16	JOHANA RUTO	6061880	0723454722	SACHANGWAN	SACHANGWAN	
17	RECHAEL LANGAT	6666468		BOROP	KAPIANGA	
18	Sang Betty	11717383	0727023013	Sachangwan	Sachangwan	
19	Florence Koskei	30667643	0716909742	Sachangwan	Sachangwan	
20	SYLVAN P. MOSOTA	0096924	0722-605574	SACHANGWN	- do -	

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: SACHANG'WAN **DATE:** 13-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	MILCAH MWANGI	24924668	0719640368	MUKINYAI	MUKINYAI	[signature]
2	JEREMIAH KIARIE	24663805	0724419968	MCA's office	"	[signature]
3	Sammy Njuguna Kangu	24174507	0723531324	Molo Town	Molo	[signature]
4	John Kungiha Kamau	1101021	0715439760	Kimanyi Farm	Kabianga	[signature]
5	IBRAHIM MAKEL	108455	0717077344666	JESOEN	KABIANGA	[signature]
6	GILBERT TUWEI	3627150	—	KIMANYI	KABIANGA	[signature]
7	Simon Langat	20602654	0703737975	~~Sachangwan~~ Chesilongo	Sachangwan	[signature]
8	ZIPPORAH KWAMBOKA	11702871	0725156112	Sachangwan	Sachangwan	[signature]
9	JACKLINE K. MOKAMBA	20693490	0714023327	Sachangwan	Sachangwan	[signature]
10	JOSPHINE NYABOKE			KABIANGA	Sachangwan	[signature]
11	SARAH OMWOYO	25110146	0720752557	SACHANGWAN	SACHANGWAN	[signature]
12	REBECCAH SARAH		0701122762	SACHANGWAN	SACHANGWAN	[signature]
13	Naomi Wangari Ndonga			Kimanyi	Sachangwan	[signature]
14	Joyce Wambui			Kimanyi	Sachangwan	[signature]
15	Simon Kemei	0714397475				[signature]
16	Ahi Mary					[signature]
17	Grace Chekono	7534510 ~~0704512464~~	0704512464	Chesowe	Sachangwan	[signature]
18	Sally Chepngetich	11163692	0725166849	Kimayech	Sachangwan	[signature]
19	Monica Wanjiku		0716909241	Sachangwan	Sachangwan	
20	Rosemary Wambui	8749998	0711962617	Kimanyi	Sachangwan	[signature]

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: SACHANGWAN **DATE:** 13-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	SANG K ISAAC	22501934	0725 960575	KAPSOIT	SACHANGWAN	[signature]
2	SHADRACK KIRUI	28173704	0712 912 913	KAPSOIT	SACHANGWAN	[signature]
3	GEOFREY SIGEI	22972891	0716 926149	CHESOEN	SACHANGWAN	[signature]
4	MALAIKWEN ARAP MNGETICH	~~[illegible]~~	0716 444398	SOIN A	SACHANGWAN	MAS
5	HELLEN KEMUNTO			Sachangwan	Sachangwan	[signature]
6	GRACE KWAMBOKA	2328116	0729052552	Kimangi	Sachangwan	[signature]
7	Wanjiku mwangi	1100977	0718964869	Kimangi	Kabianga	W.M.
8	Jane Njeri	1845684	0721700176	Kimangi	Kabianga	J.N.
9	Ester Chepkoech	23288744	0710651825	Chichon	Kabianga	
10	Ruth wangari	22222714	0710993314	Kimagi	Kabianga	[signature]
11	Emily Sitienei	2422263	0720846941	Kimangi	Kabianga	[signature]
12	SAMWEL MBURU NDABA	14408944	0724316332	Sachangwan	SACHANGWAN	[signature]
13	MANSELA NANJAMA OTIMU	0743378	0716234456	Kimangi	Sachangwan	[signature]
14	JOSEPH OSORO MBEGA	713132	0739 161828	Kimangi	Sachangwan	[signature]
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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: SACHANG'WAN **DATE:** 13-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	GITONGA N. OROGE	7886718	0729046159	Sachangwan	Sachangwan	Gitonga
2	PETER K. KARANJA	2962189	0721-334120	MUKINYAI	MUKINYAI	
3	SAMMY KORER	7104522	0716 028 699	Sachangwan	Sachangwa	
4	JOSEPH MOSES	0742663	0716 631 916	KIMANYI	KABIANGA	
5	JOSEPH MUGANE	6061652	0714 041 710	MUKINYAI	MUKINYAI	
6	AMOS M. AGALOMBA	0157078	0724648153	GETINGE	SACHANGWAN	
7	JEREMIAH KURU	12936422	0720 398 449	CHEGOBY	KABIANGA	
8	CHEGE MWAURA S.	10774881	0710256584	MUKINYAI	MUKINYAI	
9	ANDEREA OMOYO	1101507	0725 281184	KIMANY KABIANGA	KABIANGA	
10	LABAN ONGERA	024 5830158	0731629087	KIMANYI	KABIANGA	
11	DAVID KARANJA	0743980	N/A	KIMANYI	KABIANGA	N/A
12	Zacharia ASOYA	4103586	0700132020	KIMANYI	KABIANGA	
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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: SACHANG'WAN **DATE:**

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	Eng. Mark Gwena	8745128	0722459444	NAIROBI	NAIROBI	[signature]
2	Angela Wanyama	12745256	0721466139	Sachangwan	Sachangwan	[signature]
3	JOEL CHELUWONY	11522284	0723793963	CHESOEN	KABIANGA	[signature]
4	Paul K. Tesot	0605533	0722660529	Sachangwan	Sachangwan	[signature]
5	Paul Kinyanjui Chege	9126017	0724150969	MUKINYAI	MUKINYAI	[signature]
6	Francis Nagedo	8948706	0729281160	Sachangwan	Sachangwan	[signature]
7	Johnston Tuei	71045779	0716558152	Sachangwan		[signature]
8	Sammy K. [illegible]	12748463	0721881240	Kabianga	Kabianga	[signature]
9	James K. Langat	6353230	0724688206	Kabianga	Kabianga	[signature]
10	Ohioge Kennedy	11112366	0728532504	Sachangwan	Sachangwan	[signature]
11	James Wahome	7083752	0714197823	Sachangwan	Sachangwan	[signature]
12	DANIEL GACURI	10510294	0710356196	MUKINYAI	MUKINYAI	[signature]
13	Florence Nyakerario	2323630	0704512462	Getinge	Getinge	[signature]
14	Nemwel Mose Ogeto	4101199	0710879917	PONDO	Kabianga	[signature]
15	Samin Mosiri	1607078	0725748140	Pondo	Kabianga	[signature]
16	Reuben Ruto	13122389	0723997609	Sachangwan	Soin	[signature]
17	David Kiige		0722-358518	Nakuru	Nakuru	[signature]
18	Christopher Monyoncho	0378940	0724461573	Sachangwan	Kabianga	[signature]
19	Lucy Wambui		0720-414406	Sachangwan	Kabianga	[signature]
20	Sammy Towett	13127956	0710528632	Sachangwan	Sachangwan	[signature]

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: KEDOWA **DATE:** 13-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	HESBON OKARI	24452696	0723728149	NAIROBI	NAIROBI	[signature]
2	JULIUS MISOI	47532665	0726916319	KEDOWA	KEDOWA.	[signature]
3	Dr. Zablon Oonge	6412436	0733750231	NAIROBI	NAIROBI	[signature]
4	Eng Mark Gwena	8745128	0722459444	NAIROBI	NAIROBI	[signature]
5	KIRUI ENOCK.	28662229	0715160016	Kedowa	Kedowa.	[signature]
6	JOHN K. NGETICH	8207614	0715124077	KEDOWA	KEDOWA	[signature]
7	RICHARD K. TEGON	7662632	0701073191	KEDOWA	KEDOWA	[signature]
8	COLLINS K TONUI	29164612	0726701068	CHEBEWOR	KEDOWA	[signature]
9	Bonard K TONUI	24707644	0726058180	CHEBEWOR	KEDOWA	[signature]
10	ERICK K KOECH	22604107	0728740914	CHEBEWOR	KEDOWA	[signature]
11	DANIEL RUTOH	14440021	0726224548	CHERIBO	KIMASIAN	[signature]
12	DAVID K. SIRILAI	7630122	0723681073	CHEBEWOR	KEDOWA	[signature]
13	SAMMY KOECH NGENO	2314171	0751743217	KIPYIMET	CHEPSEON	[signature]
14	SIMON RUTOH	10771479	0726743117	CHEBEWOR	KEDOWA	[signature]
15	~~JOL~~ DAVID K. RUTO	8753682	0728629825	CHEBEWOR	KEDOWA	[signature]
16	RIChard Chepngetich	11526612	0728820744	Chebewor	KEDOWO	[signature]
17	DAVIES K TUEI	25187841	0729618485	TESTAI	KEDOWA	[signature]
18	David Kirui	3834525	0720723746	Testai	Kedowa	[signature]
19	PAUL K. LANGAT	8548319	0729565626	Kedowa	Kedowa	[signature]
20	GABRIEL CHERUIYOT	1762527	0724286658	CHEBEWOR	KDWA	[signature]

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: KEDOWA **DATE:** 13-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	David K. Bett	8602989	0722278950	Kedowa Town	Kedowa	[signature]
2	Patrick A. Kirui	6418239	0724564753	Chebewor	Kedowa	[signature]
3	Willy Koech	3857674	0725677677	Kedowa Town	Kedowa	[signature]
4	Richard K. Soi	4426406	0728986421	Kedowa Town	Kedowa	[signature]
5	Johana Koros	0134455	0725886640	Kedowa Town	Kedowa	[signature]
6	Joseph Sang (FCM)	1771668	0721971363	Kimasian Loc	Kimasian	[signature]
7	David Cheptoeny	5239908	0710908800	Kimasian	Kimasian	[signature]
8	Stephen Korir	5996670	0725011489	Lamaiyat	Chebewor	[signature]
9	ZACHARY CHERUIYOT KIGEN	13666932	0724613145	Kimasian	Kimasian	[signature]
10	EDWIN Kipngeno Rotich	11718061	0728762258	Chepseon	Chepseon	[signature]
11	HENRY SANG	20399784	0701536284	KEDOW		Henry
12	KIPNGENO BETT	23928318	0718893867	KIMASIAN	KIMASIAN	[signature]
13	EDWIN KOECH	25530915	0721707033	KIMUGUL	KIMUGUL	[signature]
14	Daniel Sigilai	13011606	0725455324	TULWAP	KEDOWA	[signature]
15	Wesley Rono	7853544	0712295482	Kimasian	Kimasian	[signature]
16	EVALINE CHEPKIRUI	28578843	0790148186	KEDOWA	Kimasian	[signature]
17	Paul Koech	8549312	0722382606	KEDOWA	KIMASIAN	[signature]
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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: KEDOWA **DATE:** 13 - 11 - 15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	BETT KIMUTAI WESLEY	20392509	0715 811528	EWAT	KEDOWA	
2	CHERUIYOT ROBERT	32851895	0719 707159	KISABO	KIMUNGUL	
3	KENNETH KIPLANGAT CHERUIYOT	12918614	0720857834	CHEBEWOR	KEDOWA	
4	DAVID KIPKEMOI KEMEI	11079657	0725890026	LAMBEL	KEDOWA	
5	ELISHA KIPRONO YEGON	33116402	0730945390	LAMBEL	KEDOWA	
6	ERICKSON KIPKOECH YEGON	22262948	0729535 846	CHEBEWOR	KEDOWA	
7	LEONARD KIPKEMOI BII	20283673	0725435115	KEDOWA R. FARM	KEDOWA	
8	BENSON LANGAT	24914918	0746249822	KISABO	KIMUGUL	
9	CORNELIUS KIPLANGAT RUTO	26801478	0712956163	CHEPSEON	KIMUGUL	
10	Josphat Tener	25227616	0727359595	KEDOWA	KEDOWA	
11	LANGAT .K. JULIUS	20283473	0726460505	Kimasian	KEDOWA	
12	Philip Kiplangat Bett	31102622	0720931974	Kimasian	KEDOWA	
13	Bernard Chepkwony	3863635	0726328606	Kedowa R. Farm	Kimasian	
14	Charles Rotich	21581433	~~0715485~~ 0724248183	Kimasian	Kimasian	
15	GILBERT KIGEN	26676415	0726466689	CHEPSEON	Chepseon	
16	MUTAI SAMMY	2419769	0721559913	KTB150	KIMASIAN	
17	ROSE C. NGENY	22591719	0704068 197	LAMBEL	KEDOWA	
18	JOHN BETT	11069909	0713329725	Kimasian	KEDOWA	
19	RICHARD BETT	17648869	0724885843	TUYOBEI	CHEPSEON	
20	Kennedy kemgot	23964926	0701860956	Chebewor	Kedowa	

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: KEDOWA **DATE:** 13-11-15

	NAME	ID	PHONE NUMBER	VILLAGE UNITED	LOCATION	SIGNATURE
1	Adane K. Langat	5246366	0715173129	Landiani	Londiani	[signature]
2	William K. Langat	10383371	0729280633	Landiani		[signature]
3	Patrick A. Bett	9815575	0717 386535	Landiani		[signature]
4	Simon Koskei	20916219	0703 897 037	KEDOWA		[signature]
5	CHARLES W. KORIR	27154218	0715 706 060	KEDOWA	LONDIANI	[signature]
6	John K Lele	1402807	0710 101350	KONGAMET		[signature]
7	SARAH TUGT	11202496	0720208134	CHEBEWOR		[signature]
8	JAMES K. NGETICH	21569426	0721414693	Ndarugu	KEDOWA	[signature]
9	Rop GEOFFREY	20097527	0722263143	NDRUGA		[signature]
10	David Kositany	7232688	0715816513	NDARUGU	Kedowa	[signature]
11	KIPKOECH CHERUIYOT	27518225	0706087749	KEDOWA	KEDOWA	[signature]
12	KIPNGENO SIGEI	23077138	0712986978	KEDOWA	"	[signature]
13	GERHARD Kosgei	2972[illegible]	0720925374	"	"	[signature]
14	RONO SHADRACK	32658790	0701005225	EWAT	KEDOWA	[signature]
15	Athanas Langat	12916584	0723202077	MOMONIAT		[signature]
16	Pius Mutai	6008646	.	Kimasian		[signature]
17	AGOSTINE BETT	25993218	0706 081122	KEDOWA	KIMASIAN	[signature]
18	NAHASON K. KORIR	20004525	0700038426	EWAT	KEDOWA	[signature]
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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: KELELWET **DATE:** 11-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	GLADYS C. ORWASA	10195245	0722498813	KIPTENDEN	BARUT	[signature]
2	CHERUIYOT KANGOGO	11379107	0723233681	BARUT WARD	(ADMINISTRATOR)	[signature]
3	HESBON OKARI	24452696	0723728149	NAIROBI	NAIROBI	[signature]
4	Dr. Zablon Oonge	6412436	0733750231	NAIROBI	NAIROBI	[signature]
5	Eng. Mark Gwena	8745128	0722459444	NAIROBI	NAIROBI	[signature]
6	Rasnia A. Abraham	5559556	0727179503	Kapkures	Kapkures	[signature]
7	EVANS KERING	20171740	0721619997	LALWET	KAPKURES	[signature]
8	THOMAS KIBET B.	22623938	0723443366	LALWET	KAPKURES	[signature]
9	JACOB SIGILAI	13171545	0724145804	BARUT	BARUT	[signature]
10	Joel K. Ngeretdi	0990612	0725460165	Barut	Barut	[signature]
11	Eric langat	11116673	0771087763	LALWET	Barut	[signature]
12	David ROTICH	12835626	0724262505	Angoboir	Kapkures	[signature]
13	LAWRENCE KISOI	23338888	0734032267	LALWET	KAPKURES	[signature]
14	SAMSON KOSKE	0512361	0720548695	KAPKWEN	BARUT	[signature]
15	SALLY C LANGA	1767776	0722423791	INGOBOR	KAPKURES	[signature]
16	DANIEL K CHESIMET	0441534	0721-411062	KELELWET	BARUT	[signature]
17	JACOB SI					
18	Joseph Sigei	0746190	0727939065	KIGONOR	BARUT	[signature]
19	STANLEY NGENO	11715893	0720855540	LALWET.	KAPKURES	[signature]
20	JAMES ABUGA	~~0724723085~~ 13375099	0724723085	KELELWET	BARUT	[signature]

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: KEDOWA **DATE:** 13-11-15

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	Samuel K. Bii	1751483	0717114230	Kamasian	Tostai	[signature]
2	JOHN KIPTANUI ROTICH	1770324	071036380	EWAT	KEDOWA	[signature]
3	Ronald Mongare Ndi	7572918	0713203888	Ewat	Kedowa	[signature]
4	PETERSON K.A ROTICH	10542082	0721686222	KAPKOWET	Brook	[signature]
5	BASHIR KIPRONO KIRUI	21699015	0722785933	SAOSET	BROOKE	[signature]
6	DAVID KIPROTICH MALEL	20296192	0721324626	LAMAIYAT	KEDOWA	[signature]
7	Wesly Kipngetich Kirui	20297653	0727099597	LAMAIYAT	KEDOWA	[signature]
8	Dennis Kibet Keberei	27173246	0723396804	CHEBEWOR	KEDOWA	[signature]
9	Kipsoi Nelson Kibet	12918668	0724510688	TESTAI	KEDOWA	[signature]
10	Alfred Kiplangat Cheruiyot	3840802	0700813298	Chebewor	KEDOWA	[signature]
11	Daniel K.A Bor	6606791	0710859590	Chesmot	Kericho	[signature]
12	JOSEPH KIBET Bore	6015058	DEAF	KIPYEMIT	CHEPSEON	[signature]
13	Joseph Simtwo	5241711	0726012215	Kiplekwa	Kedowa	[signature]
14	Erick Kipkoech Langat	22461884 0723981328	0723981328	Chepsir	Kipsegei	[signature]
15	Edmond mutai	22710464	0721158584	Kimasian	Kedowa	[signature]
16	Kipinoech Kimo Simon	30513327	0726039178	Ndelanyi	KEDOWA.	[signature]
17	GEOFFREY KIBET	02595356	0719606094	KIPMACHAN	KEDOWA	[signature]
18	THOMAS K NGETICH	27620222	0726564052	KEDOWA	KEDOWA	[signature]
19	DANIEL CHERUIYOT	22366344	[illegible]	KEDOWA	KEDOWA	[signature]
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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	EDNA CHERONO	20627254[illegible]	0706120087	TAITA	TINET	
2	EDNA CHEPKOSECH	20347024	0708412849	"	"	
3	ALVINA MUTAI	1116597	07057016[illegible]2	CHEPKABURET	KIPTORORO	
4	ANNAH C. SOI	7960317	—	KIPTENDEN	TINET	
5	CHRISTINER MUTAI	4750290	—	CHEPKOBURET	KEPTORORO	
6	ROSE C. MALYWA	1774545	0702939788	"	"	
7	JOYCE C. CHEMIRIOT	20463961	0713493899	"	"	
8	BENEDINE J. KEMBOI	20375267	0727676720	"	"	
9	JOYCE CHEPKEMOI	25546646	0712143870	"	"	
10	JACKLINE C. SITIENEI	1161 8057	0705608889	"	"	
11	EVERLINE C. LANGAT	20350330	0700004620	"	"	
12	SELLY C. KOECH	17493844	—	"	"	
13	HELLEN CHEPKOSKEI	11207519	—	KAPSONGOI	TINET	
14	EMILY C. MURUSOI	20725718	0707808824	SACHANGWAN	KIPTORORO	
15	ROSE C. MIBEI	11369094	0728244513	TIRITA	KIPTORORO	
16	LEAH C. MILGO	6021464	—	CHEPKOBURET	"	
17	JANETH C. CHEPKWONY	25783998	0723097807	KIPTENDEN	TINET	
18	ANGELINE C. ROTICH	20318320	0700894774	"	"	
19	DINA CHEMUTAI	20556176	0729358091	KIPLONGO	KEPTORORO	
20	BEATRICE CHELANGAT	26932847	0706654735	KIPTENDEN	TINET	
21	SALLY C. NGASURA	7632045	—	CHEPKOBURET	KIPTORORO	
22	ELIZABETH LAGAT	7082597	0702591465	CHEMATICH	KIPTORORO	

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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	STEPHEN CHERUIYOT	7639342	0724479315	CHEPKABUROI KIPTIRORO	LKIPIONORO	
2	DAVID CHERUIYOT	8546596		〃	〃	
3	KIPROTICH CHIRCHIR	28740184	0728385098	〃	〃	
4	KIPKEMOI PILIMON	20218454	0723923076	〃	〃	
5	JULIUS TORUS	22680423	0703402653	〃	〃	
6	RICHARD KIBETICH	12937532	0727170754	〃	〃	
7	HUGO TENUGEI	24897				
8	JOHN MILGO	21011553	0724817824	〃	〃	
9	DAVID KOECH	12483971	0702586484	〃	〃	
10	DAVID MAGERER	21241760	0703329057	〃	〃	
11	RUBEN SIGILAS	4753175	0723253444	〃	〃	
12	SIMEI KOECH	4286320		〃	〃	
13	ANDREA A. CHEPKWONY	8660348	0720228830	〃	〃	
14	SAMWURL BII	38525713	0713182471	〃	〃	
15	PHILIP CHERUIYOT	9537230		〃	〃	
16	PETER RONO	24685628	0729868920	〃	〃	
17	KIPSIGEI KIGEI	7130645		〃	〃	
18	KIPKORIR MUSEI	2319583		〃	〃	
19	ABIGAILE CHEPKOECH	29606374	0718757224	〃	〃	
20	PETER TIROP	25029019	0723624153	〃	〃	

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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	HENRY CHIRCHIR	13022189	0724467940	TIRITYA	KIPTOROR	
2	CHARLES ROTICH	3116573	0708828412	〃	〃	
3	WESLEY ROKO	25424295	0712266831	〃	〃	
4	DAVID LABOSO	9833620	0726305058	CHEPKUBORET	〃	
5	JEREMIAH TERER	206025	0722651342	〃	〃	
6	CHEPKWONY CHUMO			〃	〃	
7	EMILY LABOSO		0729589414	〃	〃	
8	DAVID SERBEI	20051701	0726736271	〃	〃	
9	HILLARY RUTO	30565524	0720622900	〃	〃	
10	JOSEPH ROTICH	10194714	0708631020	〃	〃	
11	DANIEL MARTIM	713195	0702423853	〃	〃	
12	LAUGAT VINCENT	24877988	0717121805	〃	〃	
13	PATRICK YEGON	24744979	0722616211	KIPTORGOT	TIMET	
14	DAVID SIGILAI	3875466	0707734988	NDOINET	KIPTORORO	
15	ARAP KIBEI	10314202	0710519356	BARAKA	CHEMARET	
16	BESOH TOWETT	26389223	0718763262	NDOEFU	〃	
17	ERICK TOO	12748835	0726451645	KIPSATA	KIPTORORO	
18	PHILIP BII	4741099		KIPSATA	KIPTORORO	
19	JOHN CHEPKWONY	20726022	0708819428	NDOINET	KIPTORORO	
20	PAUL KORIR	11525240	0723687398	KIPTORGOT	TIMET	

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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	Joseph M.A. Biwott	1771092	0722572394	Chepkabusot	Chemaltich	Biwott
2	Jackson Kiprotich A. Meli	13103884	0728291299	Kiptenden	Kabongoi	
3	David Kibetich	9712943	0786416411	Kowarey	Chemaltich	
4	Geoffry Kirui	32600809	0702210579	Kiptororo	Chemore	
5	John Kimaiwa Kito	9416718	0715945917	Tatia	Kabongoi	
6	Samwel Kiplangat Ngeresi	11718567	0721216006	Ndoinet	Kiptororo	
7	Philip Kipkemboi	24230592	0728034356	Kaboisyo	Kamwandra	
8	Alfred Kimutai Koech	24517711	0707728575	Kiptororo	Kiptororo	
9	Philip A. Cheruiyot	30097256	0710930509	Chepkoborgoi	Kiptororo	
10	Richard Kipkemoi Martim	38353000	0726452430	Chepkoborgoi	Kiptororo	
11	Jane Chemurerchesimei	24428565		Cheanuko	Kabongoi	
12	David Samoei	20664993	0714417184	Kiptororo	Kiptororo	
13	Fredrik Kipkorir Koske	14758305	0711793906	Kipsapta	Kiptororo	
14	David Kipkorir Ngeno	25391445		Kiptoror	Kiptororo	
15	Richard Terer	23942949	0728482404	Tumoiyot	Kiptororo	
16	Patrick Chepkusony	29359025	0794882199	Kiptenden	Kiptororo	
17	Geoffrey Rotich	28999476	0703871156	Kiptororo	Kiptororo	
18	Johana Kipkoech Martim	38619239	0737875604	Kiptenden	Kabongoi	
19	Francis Kipkurui Tonui	13642388	0721930898	Kiptenden	Kiptororo	
20	John Kipngeno Rotich	12800281	0726920287	Kiptenden	Kiptororo	

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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	WINNY CHELANGAT	31510216	0702745374	SACHANGWAN	KEPTORORO	
2	SIGEI BEATRICE	29206741	0707710642	KIPTENDEN	TINET	
3	PAULIN CHEPKEMOI BETUK	20189356	—	"	"	
4	EMILY SOI	28643795	0708630887	NDOINET	TINET	
5	SHARON C. KOECH	2601945	0702876726	"	"	
6	JANE C. RUGUT	11815725	0703706716	"	"	
7	~~ANNE KOSKET~~ JOYCE CHEMUTAI	25713415	0701935474	KIPTENDEN	TINET	
8	JANE BOARE	20852084	0711150095	"	"	
9	JULIANA CHEBET BICIACHA	4286446	070325594	CHEPKOBURET	KEPTORORO	
10	NANCY LAGAT	9708992	070325590	"	"	
11	JOYCE BETT	7960544	0706796857	"	"	
12	ROSE CHEBET	28780310	0719354691	"	"	
13	JAPHET KIPLANGAT TANUI	25633941	0713394691	"	"	
14	GRACE CHEROTICH KOSKEI	3827301	—	"	"	
15	JANIFFER CHEMWETICH	10770884	0721215873	"	"	
16	IRENE CHEBET	11717026	0706431920	"	"	
17	ELIZABET C. CHERUIYO	5997637	0716814487	"	"	
18	CAROLINE C. CHERUIYOT	27665128	0723385589	"	"	
19	CAROLINE CHERNGENO	27818858	0702652772	KAPGOTSIO	TINET	
20	JACKLINE KERICH	26101323	0714470659	TAITA	TINET	

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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	Philip Chepkelat	0470940	0724106136	Kapsongop	Chematich	[signature]
2	Samuel Mutai	8020990	0729918825	Kartagatiet	Chematich	[signature]
3	Paul Kimetet Langat	24221419	—	Kipsegem	—"—	[signature]
4	Vincent Ruto	24103197	0724575675	Kapsongop	—"—	[signature]
5	Alice Chepkoir Miwa	7624886	0715747096	Sachangwan	—"—	[signature]
6	Benjamin Kemboi Kipsap	11864529	0727916186	Chepkoburot	Chepmatich	[signature]
7	Paule Kiplagat Yegon	1115648	0715868398	Sachangwan	Chepmatich	[signature]
8	Robert Kibet Rotich	30155691	0718263805	Ndoinet	Chepmatich	[signature]
9	Penaline Cheptoo	33098189	0715868398	Ndoinet	Chepmatich	[signature]
10	Kipkemoi Kiringet	0857062	07..	Sachangwan	Chepmatich	[signature]
11	Leah Chebet Sambu	13020243	—	Kapsongop	Kiptororo	[signature]
12	Gilbert Kibet Chengot	32527023	0718451146	Kapsongop	Kiptororo	[signature]
13	Richard Koech Mutai	70265009	—	Kapsongop	Kiptororo	
14	Emily Chebet Rotich	20217533	—	Chepkoburot	Kiptororo	
15	Susan Cheroh Kikup	22969689	0725075293	Chemugu	Tinet	
16	Alice Chepkoech Sele	1115613	—	Chemugu	Tinet	
17	Juliane Chepkemo Chepkwony	7960663	0703940664	Chepkoburot	Kiptororo	
18	Jane Chebet Sicle	10898571	0719722029	Chepkoburot	Kiptororo	
19	Benine Chepkoech Chum	20654925	0726152290	Chepkoburot	Kiptororo	
20	Nicholas Kiplagat Koros	28603537	0727822912	Kapsongop	Kiptororo	

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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	Nancy Chepto Rutoh	11346080		Chemgu	Tinet	[signature]
2	Kipkungat Ngeno	29056997	0723 365666	Chepkoburot	Chematich	[signature]
3	Judy Chepkoech Ngeno	28745550	0716 185632	Chepkoburot	Chematich	[signature]
4	Gladys Chepngetich	225849[illegible]	0729699020	Chepkoburot	Chepkoburot	[signature]
5	Evaline Maritim	20497137	—	Kiptenden	Tinet	[signature]
6	Ann Kosgei	7994960	07206 25894	Kiptenden	Tinet	[signature]
7	Janeth Chelangat	12556733	—	Ndoinet	Chepkoburot	[signature]
8	Ruth Chepkorir	6015020	~~0702~~	Sachangwan	Chepmatich	[signature]
9	Janet Chelangat	21159270	—	Chepkoburot	Chepmatich	[signature]
10	Jeneth Chepngeno Tonkei	1107[illegible]53	0702790614	Chepkoburot	Chepmatich	[signature]
11	Janeth Chebet Ngeny	11618026	—	Ndoinet	Chepmatich	[signature]
12	Joyce Chepkemoi Yebei	30187503	0708588476	Kiptenden	Tinet	[signature]
13	Alice Chelangat Tare	5232698	0728557759	Chepkoburot	Chepmatich.	[signature]
14	Linah Cheptoo Leigo	13546507	0702 372242	Chepkoburot	Chepmatich	[signature]
15	Beatrice Chepwogen	23164819	0724550078	Chepkoburot	Chepmatich	[signature]
16	Paulo Kipkemoi Mitei	7656058	—	Chepkoburot	Chepmatich	[signature]
17	Rachel Chepngeno Sau	13123790	- —	Chepkoburot	Chematich	[signature]
18	Selly Chepkemoi Koech	11438644	—	Chepkoburot	Chematich	[signature]
19	Joyce Chepkemoi	25546646	—	Chepkoburot	Chepmatich	[signature]
20	Ruth Cherotich Soi	20706634	0706655047	Ndoinet	Chepmatich	[signature]

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Dam site. (8)

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	JEREMIAH SOI	0326896	0714025887	CHEKOBUROI	KIPTORO	
2	~~Tyson Kibet Korir 0723796309~~					
3	CHELANGAT MILKER	32696760	0703862294	SACHANGWAN	KIPTORO	
4	DENIS NYENO	24310000	0714116541	NDOINET	KIPTORO	
5	WILSON MUTAI	20233973	0713430112	CHEPKOBUROI	KIPTORO	
6	TYSON KIBET KORIR	12920302	0723796309	SACHANGWAN	KIPTORO	
7	CHARLES KIRUI	23434637	0715234402	KAPSONGOR	KIPTORO	
8	RICHARD KERING	5220457	0728524785	TIRITA	KIPTORO	
9	WESLEY KIPKORIR RONO	24441632	0718266079	SACHANGWAN	KIPTORO	
10	RUTH CHEPNGENO	11795586	0710666209	KIPTENTEN	KIPTORO	
11	AGNES CHEPKEMOI CHEPKEMOI	11115959	0703227166	CHENUKU	TINET	
12	WESLEY K. MUTAI	9640464	0710705527	KIPTIEGEN	TINET	
13	KENNETH KIPHANGAT ROBAR	33447259	0701107523	KIPKONGON	KIPTORO	
14	HILARY KIPYEGON TEREN	25630968	0718284752	TIRITA	KIPTORO	
15	REUBEN KOBEI KOR KOROP	5222596	0717031029	CHENUKU	TINET	
16	MARTIN KIPHANGAT KOECH KANGAT	31095506	0703862294	SACHANGWAN	KIPTORO	
17	NELLY CHEPKIRUI	28991785	0707425311	CHEPKOBUROI	KIPTORO	
18	MERCY CHEPKEMOI ANUSCA	20904764	0713065739	CHENUKU	KIPTORO	
19	JANETH CHEPKIRUI SIGEI	13771820	0728557259	KIPSAPTA	KIPTORO	
20	ANJELINE-CHANGE	9871870	0723859772	CHEPKOBUROI	KIPTORO	

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	Emmanuel Kiprono Korir	28383131	0716881268	Kapsongor	Kiptororo	
2	Rotich Alfred	22578793	0712407069	Kapsongor	Kiptororo	
3	Marta Cherono	11528195	0725655726	Chepkoburot	Kiptororo	
4	Elen Chesang Ngeno	12782342	0707201598	Chenugu	Tinet	
5	Mark Kugo Rono	2846172		Chepkoburot	Kiptororo	
6	Samary Chepkirui Tungut	21374475	0714982103	Kipsegem	"	
7	Caroline Chepkemoi	26815881	0711605337	Chenugu	Kabongoi	
8	Rosaline Chepkorir Mosi	9832457	0704586699	Chenugu	"	
9	Isaiah Kiprono Kikwai	23954288		Chepkoburot	"	
10	Jane Chelangat Tesot	20217350	0707085892	Chenugu	"	
11	Catherine Chepkorir Cherugut	5232967	0700422655	Chepkoburot	Kiptororo	
12	Hanna Chepkemui Chenkai	20393960	0723804328	Kiptororo	Kiptororo	
13	Rose Chepkemoi Cheruiyot	21748342	0721339326	Kiptororo	Kiptororo	
14	Benjamin K. Sowe	3552521	0725974523	Kiptororo	Kiptororo	
15	Jackline C. Lagat	24864027	072760080			
16	Duncan Rotich	21375656	0720531804	Tinet	Tinet	
17	David Korir	9714553	0722269352	Tinet	Tinet	
18	Stephen K Singer	0728899169	13441166	Tinet		
19	Daudi K. Ruto	0723298150	0723298150	Kiptororo	Kiptororo	
20	Daudi K. Ruto	12713832	0723298150	Ndoinet	Kiptororo	

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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	Emily chebet	3307404	0701073646	Kapsokop	Kiptororo	
2	Erick Kengeno	21840276	0715450557	Kapsongop	Kiptororo	
3	DENIS KIRUI	26936760	0722932257	Kipsapta	Kiptororo	
4	Rachel Koskorir	4286130	0706093235	Sach-4	Kiptororo	
5	caroline chelangat	32195731	0701622860	Kipsapta	Kiptororo	
6	Paul mutai	21256834	0723031481	Kiphongon	Kiptororo	
7	Metson Korir	20062688	0700721343	Tinet		
8	Kimi Kipkoech Simon	21364303	0710362368	Kiplongdan	Tinet	
9	Kimutai A. Rotich	32227137	0705227244	4 Tirita	Kiptororo	
10	Bartuiyot Kiplagat Benci	4559647	0702745374	Kipsapta	Kiptororo	
11	Janet chemutai	4640154	0729655366	Chepkoburot	Kiptororo	
12	Jane chepkoskei chuma	11718170	0729358091	Kapsongop	Kiptororo	
13	Philimon mutai	24345727	0705656565	Kiplongony	Kiptororo	
14	Paul Kiprono Soi	8894558	0701282673	Esisiyat	Kiptororo	
15	Langat John chengat	2127 5015	0710976625	sachangwan	chematich	
16	Sarah Chepkorir Tuimising	1331183	0713124160	Ndoinet	Chematich	
17	Joyce chemutai	26482088	0717521339	Ndeme	Chemaneo.	
18	Susan chepkurui mutai	11826952	0703862290	sachangwan	chematich	
19	Samwel Kimutai Sinei	3872992	0715295317	Kapsongop	Chematich	
20	Kiprotich Robert Ngeno	21282121	0719327664	Kiplongony	Kiptororo	

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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	MICHOLAS RARIEYO	14439064				
2	CORNELIUS MUTAI	5722094				
3	DAVID BETI	4759487				
4	SAMUWEL CHERUIYOT	12803211	0718414 92	CHEPKOBUROT	KIPTORORO	
5	MICHOLAS LANGAT	23536384				
6	JOEL K LANGAT	7130732	0726728443	CHEPKOBUROT	KIPTORORO	
7	FRANCIS KORIR	17432366	0710475466	Chepkoburot	"	
8	ALEXANDER LANGAT	07063377	0712971533	"	"	
9	KIPNGENO ARAP CHIRCHIR	5584154		"	"	
10	GEOFFREY KIPLANGAT TOILET	11718513		"	"	
11	JACKSON RUTO	11406816	0726558359	"	"	
12	WESLEY KIGEN	23088976		"	"	
13	STEPHEN BARIMEN	0869728		"	"	
14	PATRIK RONO	13621139		"	"	
15	WILSON KIBEI RUTO	11298691	0713776832	"	"	
16	Sammy Kipsigei Ngeno	2346037		"	"	
17	Philip langat	25008582		"	"	
18	David KiKwai Kiprotich	23920114	0710 646585	"	"	
19	David Kipngeno Mutai	1794110		"	"	
20	Benard kimutai Sang	27193907	0708 291621	"	"	

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	Annah Chelangat Mutai	8659073	—	Chepkoburot	Chepmatich	
2	Emily Chebet Koto	20654893	—	Chepkoburot	Chepmatich	
3	Stell Chelangat	27809537	—	Chepkoburot	Chepmatich	
4	Betty Chepkurui Bowsen	23065415	0705745374	Chepkoburot	Chepmatich	
5	Alice Chelangat	7227881	—	Chepkoburot	Chepmatich	
6	Jaeline Chepkorir	13669959	0700356861	Chepkoburot	Chepmatich	
7	Joseph Kiprono Koech	30516844	—	Chepkoburot	Chepmatich	
8	Nancy Chepkurui Kaskei	24092 19	—	Ndonet	Chepmatich	
9	Sofia Cherono Cheruiyot	12784000	—	Ndonet	Chepmatich	
10	Tobitha Chemutai	22822669	0700787651	Chepkoburot	Chepmatich	
11	Annah Chepchirchir Kilel	12742571	0706460507	Ndonet	Chepmatich	
12	Margret Cherono Nemiah	11070711	—	Ndonet	Chepmatich	
13	Lucy Tattany Kemoi	31395356	—	Ndonet	Chepmatich	
14	Emily Cherono Tuei	11115281	—	Boron	Kamwaura	
15	EDDY C. SOI	13129781	0721950429	Chepkoburot	Chematich	
16	Rael Chepkurui Tela	3875927	—	Chepkoburot	Kiptororo	
17	Anna Chepkorir Sitienei	6014515	—	Chepkoburot	Kiptororo	
18	Grace Chelangat Sigowo	2350577	—	Sachangwan	Kiptororo	
19	Bornes Cherono Tuiyu	1740125	—	Ndonet	Kiptororo	
20	Zachaus Kimgetich	7629378	0725757105	Ndonet	Kiptororo	

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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	HARON M. ASANYO	7223256	0711813146	KABONGOI	TENET	[signature]
2	FRANCIS MUNGOISOI	8750810	0726072377	CHEPTAGUM	CHEPTAGUM	[signature]
3	BIDIS CHEPNGENO	12740329	0714470064	CHEPKOBURE	KIPTORORO	[signature]
4	Julius Langat	21123376	0719100818	CHEPKOBURDT	KIPTORORO	[signature]
5	ZACHARIAH MOGOAH	20535755	0721216273	CIPOITO	TINET	[signature]
6	Flora maren mecunn	28281378	0715579899	SITOITO	TINET	[signature]
7	GITERI OGOT Jimleuus	26627611	0728857611	KAMWAURA	KIPTORDO	[signature]
8	David SITIENY	8352052	0725332880	Tinet Know	Tinet	[signature]
9	Mathew Semmy	20229043S	–	–	Tinet	[signature]
10	Christopher A.		0727137485			
11	Paul Chepkwony	7082156	0728858099	TINET	Tinet	[signature]
12	ALICE B. MAGARI	25035605	0712748610	TINET	TINET	[signature]
13	ANTHON M. WAWERU	20405998	0720267832	TINET	TINET	
14	KIPKOSKEI MUTAI	13104202	0720663414	TINET	TINET	
15	EZEKIEL KIPLANGAT N	0869231	0712840687	TINET	TINET	[signature]
16	KOECH MOSES	23706530	0725208541	CHEPTAGUM	TEMYOTTA	[signature]
17	PAUL KIPYEGON CHERUIYOT	20059788	0725075316	KABONGOI	TINET	[signature]
18	LONNER CHEPKIRUI LANGAT	26991929	0724302016	CHEPKOBUROT	TINET	[signature]
19	KIPROTICH TUEI LEONARD	29640331	0718871429	NDOINET	KIPTORORO	[signature]
20	GRACE CHEMTAI PUNGUS	4277553	0726890851	NDOINET	KIPTORORO	[signature]

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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	LILY C. SOI	11618198	0721578040	CHEPKOBURIOT	KIPTORORO	
2	CHARLES K. NGENO	23487682	0719531690	"	"	
3	SARAH C. CHERUIYOT	33216040	0725[illegible]9392	NDOINET	TINET	
4	CHRISTINA C. SIGEI	8021180	0724[illegible]4602	"	"	
5	SHARON CHERU	25963152	0712871216	CHEPKOBURIOT	KIPTORORO	
6	STELLAH CHEPNGETICH	20927363	0721629288	"	"	
7	JONATHAN K. SITIENEI	2411141	0711282217	NDOINET	TINET	
8	JANE CHEBET	10935883	0713843248	KIPTONGOTON	TINET	
9	GRACE C. TONUI	4743121	0726153965		KIPTORORO	
10	ALICE C. SAROON	1161 8029	[illegible]	NDOINET	TINET	
11	JANE CHUMA	33740850	0737070550	"	"	
12	REBECCA C. TESOT	6496386	0707083592	CHEMATICH	KIPTORORO	
13	CHRISTINE C. BOWEN	12793873	0719359766	NDOINET	KIPTORORO	
14	ESHER C. TEMKE	3863707	0729658233	"	"	
15	RICHARD K. BIRIR	07388837	0728837	KIPSABTA	KIPTORORO	
16	ROSALINE C. TEMKE	1767704	—	NDOINET	KIPTORORO	
17	SALINAH C. MAINA	6021440	0700176856	CHEMATICH	KIPTORORO	
18	IRINE C. CHEPKURUI	2029267	0727[illegible]5507	NDOINET	KIPTORORO	
19	ALICE C. CHEPKWONY	13373798	0716176523	"	"	
20	ELISAH K. RONO	11430626	0712249808	CHEPKOBURIOT	"	
	ESTHER C. CHERUIYOT	6019371	0717528463	NDOINET	"	
	GEOFFREY K. TONUI	27202525	0711387010	"	"	
	ROBERT C. KOECH	26346278	0704833853	CHEMARE	"	
	WESLEY K. KILEN	23088976	0700135 05	CHEPKOBURIOT	"	
	FLOMENA CHEPKEMOI	32592157	0702210475	CHEMATICH	"	
	ROSE CHELANGAT	12934647	0707192 61	KIPSAPTA	"	
	RACHEL MARITIM	4746671	—	BARTALATIET	"	
	ANDERSON K. KIPRONO	12923115	0719453788	CHESINGET	"	
	BEATRICE CHEBERET	27500316	[illegible]	[illegible]	"	

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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	LEONARD C KIRUI	20243762	0726482506	CHEPKOPUROT	KIPTOROR	[signature]
2	LILY CHEPNGENO					
3	RECHO C KOECH	2412511		CHEPKOPUROT	KIPTORORA	[signature]
4	WESLEY NGETICH	28248618		TINITAI		
5	ANNA C BOTCH	11718238	0706674082	KIMOSWON	KIPTOROR	[signature]
6	ALBIN K. SANG	3841806	0712584393	TAITA	TINET	[signature]
7	STENDLY K KOSKEI	20947127	0704032975	TAITA	TINET	SKK
8	GEOFREY KIPLANGAT	9557919	0711490073	TAITA	TINET	[signature]
9	TAPSABEI C. MITEI	2348592	0710448930	KURES	CHEMARE	[signature]
10	IRINE C. MAGERER	1115589	0706888696	KIPKORIS	KIPTORORO	[signature]
11	MARY C. MARITIM	12327981	0712872358	KIPSCKEM	Chematica	[signature]
12	BEJAMEN.K. Chepkwony	32391188	0718153284	TAITA	TINET	[signature]
13	SCOLAR Chepkoech	31537796	0714584493	TAITA	TINET	[signature]
14	CHRISTINA.C.KOECH	33877542		KAPSONGOP	KIPTORORO	[signature]
15	KIPKEMOI.A.TUWE	0856441	0718971955	KABONGOI	TINET	[signature]
16	BENARD KORIR	32167553	0711244486	KIPKORIS	KIPTOROR	[signature]
17	BENARD.K. KIRUI	33533791	0712902231	KABONGOI	TINET	[signature]
18	RAEL.C.CHEMOIWO	0587110		CHEPKABOR	KIPTOROR	[signature]
19	ZEDDY.C.CHEROSIOM	3841974	—	TAITA	TINET	[signature]
20	BAETRICE.C.SANG	30895848	0712584393	TAITA	TINET	[signature]
21	Richard.K.BORE	10991448	0717821955	KIPTOROR	ChepkABoRO	[signature]
22	KIPRONO A-SIGIRA	1777245	—	KAPSOGOP	KIPTOROR	[signature]
23	ELIJAH.K.YEGON	27783751	—	KAPSONGOP	KIPTOROR	[signature]
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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	JOSEPH GITAMO	25994354	0728942414	Kariba	Chemaner	[illegible]
2	William TOBON	2346133	0711157573	Ndoinet	Kiptororo	[illegible]
3	Kenneth [illegible] Keino	23896273	0710488824	Kohiba	[illegible]	[illegible]
4	KIPROTICH TUEI Leonard	29640331	0718871429	Ndonet	Chepatich	[illegible]
5	Benjamin C TOO	22902661	0725995972	Kipsapta	Kiptororo	[illegible]
6	DAVID K LANGAT	11070988	0711191351	CHEMATICH	KIPTORORO	[illegible]
7	Richard Keino	20198779	0710488824	Kokoyan	SOSIOT	[illegible]
8	David Kiprono Boge	11432030	0720605788	Korabainet	Kiptororo	[illegible]
9	Simon Kipkering Soi	3851174	07	Chepkoburol	ndoinet	[illegible]
10	BETTY CHERONO	31864558	0712560122	NDOINET	NDOINET	[illegible]
11	Alice Chepkorir Toel	11466311	0711533618	Tinet	Tinet	
12	Rosaline Chepkemoi mutai	11364474	0705589569	Tinet	Tinet	
13	Rebecca Chepkor	12834217	0723783734	Tinet	Tinet	
14	David Talam	13340985	0712-1747	Ndoinet	Kiptororo	
15	Purle Kipkor mutai	21256831	0723237481	Kapsongop	Kiptororo	
16	Annah Chemutai [illegible]	9886879	07	Chepkoburot	Kiptororo	
17	John Cheruiyot Koech	12744073	—	Kipkoris	Kiptorori	
18	Ruben [illegible] Tonui	1087776	0714653921	Ndoinet	Kiptororo	
19	Disney Kipsang Bett	25660452	0706655[illegible]	Ndoinet	Kiptororo	
20	Philimon Kingoro Kirui	27773676	0790892688	Chepkoburot	Kiptororo	

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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	ALICE CHEPKEMOI TUIYA	12783231	0710864210	CHENUGU	KABONGTOI	
2	LILIAN CHEPKIRUI TOWETT	20332558	0715385229	KAMOCHOIMET	KABONGOI	
3	ESTHER CHERONO KAPKEIACH	2348776	0715385229	KAMOCHOIMET	KABONGOI	
4	ANNA SITONIK	11718976	0715952038	CHEPKOBUROI	KIPTORORO	
5	ZEDDY CHEPKORIR CHIRCHIR	2414375				
6	HELLEN CHEMUTAI KIMOBEN	5453910	0708289964	CHEPKOBUROI	KIPTORORO	
7	BETTY CHEPKEMOI BETT	21857241	0701103511	CA "	"	
8	CAREN CHEPKORIR	28672706	0710342220	"	"	
9	ALICE KORIR	9640036	0710751433	KIPTENDEN	KABONGTOI	
10	MARY ROTICH	33228333		"	"	
11	CLARA CHELANGAT KEBENEI	12796995	0703141414	CHENUGU	KABONGTOI	
12	JANETH CHEPNGETICH TERER	7132483	0707735183	CHENUGU	KABONGTOI	
13	MARY-C BORE	12837076	0704471681	CHENUGU	"	
14	JACKLIN SANG	31145639	0701476118	CHEPKOBUROI	KIPTORORO	
15	LEAH CHEPKEMOI RONO	13379404	0711815589	"	"	
16	ESTHER CHEPNGENO RONO	2348765	0729652025	"	"	
17	PETER KIPKURUI CHERUYOT	21811022		"	"	
18	BEATRICE CHEPKORIR MARITIM	20688821	0729511583	"	"	
19	CHERUYOT MUTAI	08722063		"	"	
20	EDNA CHEPKORIR LANGAT	9370391	0702506881	CHENUGU	KABONGTOI	

LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	Alice C. mengesu	1747401	0718147333	Kiplecden	Kiptoraw	[signature]
2	Hellen Chenshoi	31903637	0710382290	Kip	Kiptoraw	[signature]
3	Sharon chepkoech.	33752694	0719684783	Kiplecden	Kiplecden	[signature]
4	Richard Kosgei	5236833	0707735131	Cherato	Kiptoraw	[signature]
5	Selly chepkirui	7633424	0724817723	Kiplecden	Kiptoraw	[signature]
6	Paulo Sang		0721157034	Chepkobusil	Kiplecden	[signature]
7	Kimisoi Sang	3318662	0707734974	Chepkobus	Kiptoro	
8	Sharon Chebet Siele	25031716	0713815792	Chepkobunt	Kiptoraro	[signature]
9	Agnes Chelangat	11829684	0710964630	Kiptendon	Kiptoraro	[signature]
10	Winny Chepmitai	29727661	0711755937	Chepkobus	Kiptoraro	
11	Robert Kimgeno Lagat	22374962	0710460282	Cheplo	"	
12	Betty Remoi	21940453	0729092873	"	"	
13	Lucy Chepkoech	20020926	0726152730	"	"	
14	John Kipmutai Korir	3879319	0716237585	"	"	
15	Kristine Rague	10949537	0707734974	"	"	
16	Martin Kirui	4788637	0710369266	"	"	
17	Alexander Kipsang Siele	31162471	0701297567	"	"	
18	Joel Chelsit	32524178	0721542390	"	"	
19	Bornes Chelngeno	1111593	07	"	"	
20	Esther Kosgei	2329050	0724809024	"	"	

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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	HESBON OKARI	24452696	0723728149	NAIROBI	NAIROBI	
2	JOHN MUMAI	9832639	0722336862	CHEPKOBURET	KIPTORORO	
3	Eng. MARK GWENDA	8745128	0724597447	NAIROBI	NAIROBI	
4	LYDIA N. GATHUKU	11128429	0721 607645	SONDU MIRIU	SONDU MIRIU	
5	WILLIS O. OCHIENG	11611119	0722861707	NAIROBI	NAIROBI	
6	JOHN KOECH	5276924	0703461118	CHEPKOBURET	KIPTORORO	
7	MICHAEL SANGCHA	8897706	0722977397	ITERE DAM	KIPTORORO WARD	
8	Leonard Sang	24013095	0710364834	Tinet/Kipkenda	Tinet	
9	RICHARD K. SIOTO	10382385	0727209424	NDOINET	KIPTORORO	
10	STEPHEN K LABOSO	6546538	0727856516	CHEPKOBUROT	KIPTORORO	
11	Simon BETI	12837210	0720252433	Chepkobunt	Kiptororo	
12	Sammy Chepkwony	1746038	0729804730	Chepkobunt	Kiptororo	
13	Wilson Robich	1363893	0711271804	Sach-angwan	Kiptororo	
14	Newton Chemjor Kirui	8547869	0720019240	Chepkobunt	Kiptororo	
15	Cornelius K. Sang	9726153	0724683513	Ndoinet	Kiptororo	
16	PAUL K Mabwai	12980259	0726296918	Kipsapta	Kiptororo	
17	PHILIPH TOO	23667991	0727499017	CHEPKOBORO	KIPTORORO	
18	Solomon K MAGUT	11605517	0722492693	Chepkaburot	KIPTORORO	
19	CHRISTOPHER K KORIR	24552551	0714083141	Sach angwan	KIPTORORO	
20	ROBERT K. LANGAT	23824019	0724807485	NDOINET	KIPTORORO	

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LIST OF ATTENDANTS FOR ITARE DAM WATER SUPPLY PROJECT ESIA & RAP PUBLIC PARTICIPATION

VENUE: NDOINET KWA BRIDGE **DATE:** 18-11-2015

	NAME	ID	PHONE NUMBER	VILLAGE	LOCATION	SIGNATURE
1	BENINNY RONO RUTTO	4259921	0722972746	CHEPTARAGAH	KIPTORORO	[signature]
2	CHRISTOPHER LANGAT	11718559	0720692718	CHEPKOBURET	"	
3	RICHARD KIPKORIR CHERUIYOT	9729459	0721755865	KABONGOT	TINET	
4	DAVID KOECH	0198407	0717493240	NDOINET	KIPTORORO	
5	JULIUS KOMINGOI	2543641	0712247911	KIPSAPTA	KIPTORORO	
6	CHARLES ROTICH	1750467	0703644553	CHEPKOBURET	KIPTORORO	
7	ISMAEL KOECH	20653028	0728533768	KIPLONGON	KIPTORORO	
8	GAVIN CHEPKWONY	28584889	0722078694	TICOA	KIPTORORO	
9	G KIPKETER ARAPSOI	11637104	—	KIPLONGON	KIPTOROR	
10	PAUL KIKWAI	9370400	0707233497	TAIPA	TINET	
11	VINCENT BII	12784723	0710462825	SACHO ANGWAN	KIPTORORO	
12	STEPHEN TANUI	6007998	—	"	"	
13	LUCY CHEPKOECH MALEL	7104247	—	CHEMANER	TINET	
14	TAPRANDICH C. KIMTAI	4287196	—	CHEPKOBURET	KIPTORORO	
15	SARAH CHEPKURUI SEREM	4405943	—	"	"	
16	EVALINE C. KOECH	12834481	0717057853	"	"	
17	NANCY CHERONO SUKUT	12783547	0715164431	CHEMANER	TINET	
18	ALICE CHEBET TEMBECH	8949059	0716977973	KIPTENDEN	TINET	
19	VICKY CHELANGAT	28694268	0701971360	"	"	
20	WINNY RONO	25580574	0710430679	"	"	