SABOR IRRIGATION DEVELOPMENT PROJECT

Environmental and Social Impact Assessment (ESIA) Study Report for Sabor Irrigation Flood Flow-Water Supply Transmission and Distribution Lines Project, Uasin Gishu County.

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National Irrigation Board Project

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CERTIFICATION

The preparation of this Environmental and Social Impact Assessment was commissioned by the NIB of the Republic of Kenya, in fulfillment of requirements of the ESIA/EA Regulations, 2003 and Environment Management and Coordination Act, 1999.

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ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ALARP	As low As Reasonably Practicable
AoI	Area of Influence
ARVs	Anti-Retroviral
CBD	Convention on Biological Diversity
CEC	County Environmental Committee
C-ESMP	Construction Environment and Social Management Plan
CGU	County Government of Uasin Gishu
CIDP	County Integrated Development Plan
COC	Code of Conduct
COD	Chemical Oxygen Demand
EA	Environmental Assessment
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Monitoring Plan
ESC	Environmental Safeguards Consultants
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMoP	Environmental and Social Monitoring Plan
ESMP	Environmental and Social Management Plan
ESP	Economic Stimulus Project
FGD	Focused Group Discussions
FIDIC	Federation of Consulting Engineers
GBV	Gender Based Violence
GIIP	Good International Industry Practice
GIS	Geographical Information System
GoK	Government of Kenya
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
H&S	Health and Safety
HDPE	High-density polyethylene
HIV	Human Immuno-Deficiency Virus
ICP	Informed Consultation and Participation
IDA	International Development Association
IE	Impact Evaluation
IPV	Intimate Partner Violence
IWA	International Water Association
KeNHA	Kenya National Highways Authority
KuRRA	Kenya Urban Roads Authority
M&E	Monitoring and Evaluation
MENR	Ministry of Environment and Natural Resources
MIR	Minimum Internal Requirements
NBSAP	National Biodiversity Strategy and Action Plan
NCC	National Complaints Committee

NEAP	National Environment Action Plan
NECC	National Environmental Complaints Committee
NED	National Environmental Department
NEMA	National Environment Management Authority
NET	National Environment Tribunal
NET	National Environment Tribunal
NGEC	National Gender and Equality Commission
NGOs	Non-Governmental Organizations
NIB	National Irrigation Board
NLC	National Land Commission
NMK	National Museums of Kenya
NPMU	National Project Management Unit
NRW	Non-Revenue Water
NTP	Notice to Proceed
O&M	Operation and Maintenance
OSHA	Occupational health and safety Act
PAC	Project-affected Communities
PAPs	Project Affected Persons
PEHD	polyethylene high-density
PIU	Project Implementation Unit
PPE	Personal Protective Equipment
PRE	Project Resident Engineer
PSC	Project Steering Committee
RAP	Resettlement Action Plan
RCoI	Resettlement Corridor of Impact
RoW	Right of Way
SEA	Sexual Exploitation and Abuse
SERC	Standard and Enforcement Review Committee
SH	Sexual Harassment
SMEs	Small, Medium Enterprises
STIs	Sexually Transmitted Infections
STIs	Sexually Transmitted Infections
TMP	Traffic Management Plan
ToR	Terms of Reference
Upvc	polyvinyl chloride
VAC	Violence against Children
VCT	Voluntary Counselling and Testing
WHO	World Health Organization
WIBA	Work Place Injuries and Benefits Act
WMP	Waste Management Plan
WRMA	Water Resources Management Authority

EXECUTIVE SUMMARY

This document is an Environmental and Social Impact Assessment (ESIA) for Sabor irrigation Water Supply Project transmission pipeline which is being funded by the National irrigation board

BACKGROUND

The proposed Lower Sabor irrigation development project will be located in Tembelio Location, Moiben Constituency in Uasin Gishu County and the flood flow-water harvesting will be in Elgeyo Marakwet county. The project is anticipated to cover 175 acres of land and to benefit about 700 farmer households distributed all over the area. The project is estimated to cost Ksh 250, 085,350.

The works will involve construction of flood flow-water intake in Elgeyo Marakwet along River Sergoit/Chepkoilel, installation of water transmission/conveyance pipelines, distribution lines domestic water pans and infield irrigation systems distributed in Uasin Gishu County.

The project during its operation phase will involve growing of horticultural crops like passion fruit, tomatoes, onions, vegetables and other high value crops

LOCATIONS OF PROJECT

The proposed Lower Sabor irrigation development project will be located in Tembelio location, Moiben Constituency in Uasin Gishu County. The flood flow-water intake will be in Elgeyo Marakwet along River Sergoit/Chepkoilel.

Figure 0-1.Location of Project

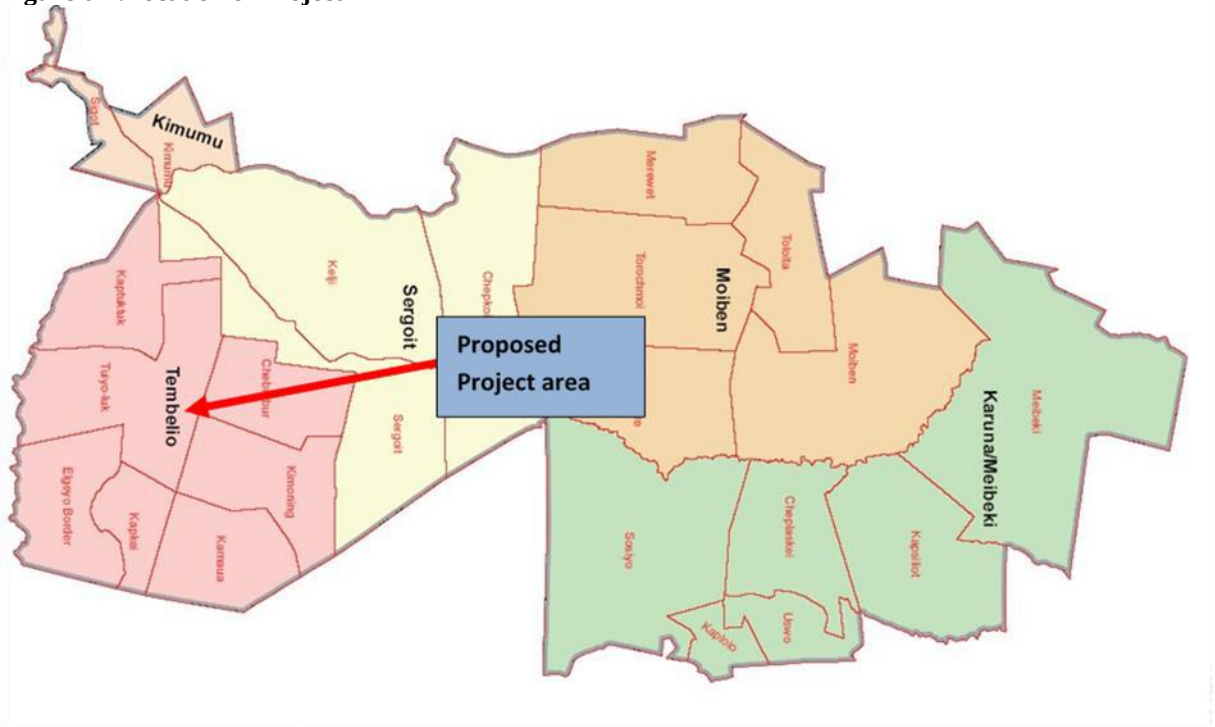
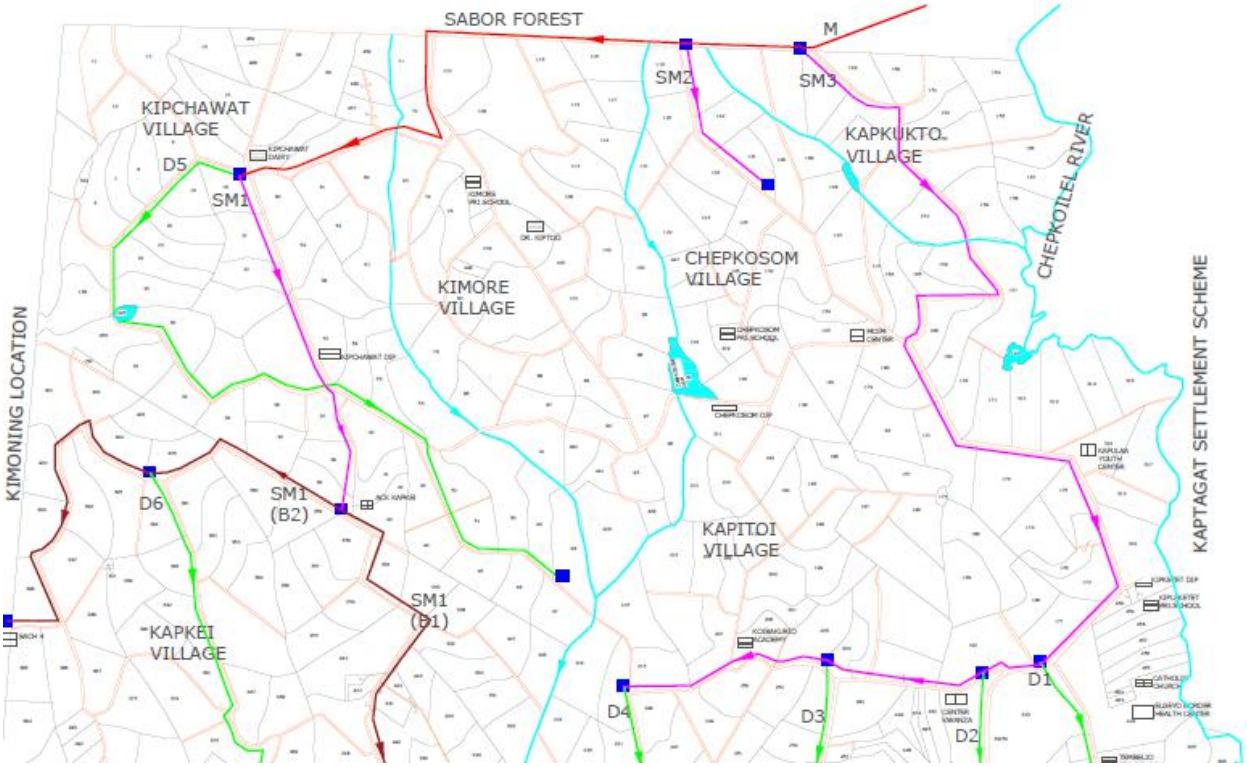


Figure 0-2. Project Pipeline Routing



INFRASTRUCTURE COMPONENTS

The proposed project involves all the activities that will ensure delivery of water from River Sergoi flood flow-water to lower Sabor. These will include transmission lines to existing dam reservoirs at Chepkosom and Kisenei, and distribution lines to finally deliver water to the farmers domestic water pans for storage to be used in the dry spell. This project is envisaged to 700 households each with ¼ an acre dedicated for irrigation farming. The total area targeted for this phase of the project is 175 acres. Water from the river will be connected to a transmission main to eventually connect to a distribution pipeline (see figure 0-3 showing the network). The description of transmission lines, and distribution lines are described in detail below.

Transmission Lines

Wherever feasible, transmission lines will be located adjacent to roads or other existing RoW subject to pipeline diameter and exact pipe alignment. The pipe trench depths shall be as follow:

1. In areas where the pipe is subjected to vehicular traffic, the minimum depth of cover to be provided is 1.0 m above top of pipe
2. In other areas, the minimum depth of cover above top of pipe is 0.8 m; and
3. If the above depths cannot be obtained due to the natural ground profiles, concrete encasement for

pipes will be considered.

4. Marker posts will be erected in order to indicate the location of the pipelines and appurtenances. This will involve excavation, laying and covering of 17,900m long DN100 to DN180mm, PN16 Transmission Main.

From the river the transmission lines will be laid and used to transmit water to the distribution lines. From The transmission lines will then take the water and deliver by gravity to the distribution lines.

Distribution Lines

The principal components of the distribution networks shall be the primary, secondary and tertiary distribution mains. It is the primary and secondary mains, which shall be included under this project and will be constructed in a single stage. The minimum diameter of the primary and secondary mains will be determined from hydraulic analysis. Tertiary distribution mains are to be utilised as part of the house connection programmes and shall be constructed as and when appropriate. These will involve network improvements and extensions DN 100 to DN 50 of Length 16,125 m.

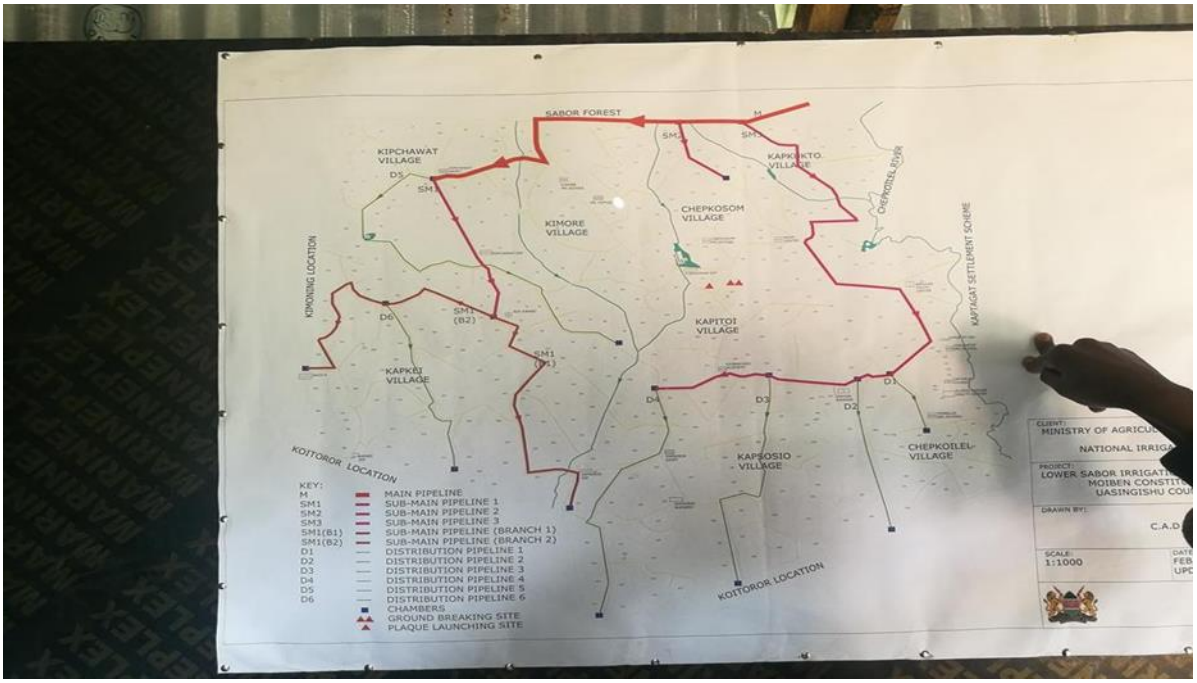


Figure 0-3. Project General Layout

ENVIRONMENTAL AND SOCIAL SAFEGUARDS

The Project will apply a complete set of environmental and social safeguards to protect against adverse impacts on the bio-physical and social environments. All of the activities under the NIB and in particular the construction and operational requirements for infrastructure works will be implemented in compliance with the Good international industry practice (GIIP) of environmental and social safeguards, as well as Kenya's environmental and social laws and regulations, licenses and permits.

THE ESIA METHODOLOGY

This ESIA was prepared in compliance with GIIP and also in compliance with Kenya's environmental law and regulation specifically the Environmental Management and Coordination (Amended) Act of 2015 typically referred to as EMCA. The ESIA was carried out through screening and analysis of various

environmental and social parameters, field investigations and stakeholder consultations. The ESIA covers the relevant general environmental and social profile of Uasin Gishu County and includes an assessment of the potential environmental and social impacts during different project phases and formulation of corresponding mitigation measures.

Desktop Studies

This mainly involved;

- Review of the Design Report for Sabor irrigation Water Supply, including subsequent annexes to the report in order to establish the project scope, background and potential impacts.
- Review of relevant legislations applicable to this project including the Environmental Impact Assessment and Audit Regulations 2003; The Environmental Management Coordination Act (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 Water Act (2016), the Constitution, The Public Health Act (CAP. 242), Employment Act (2007), Childrens Act (2012) among others.
- In addition to the local legislation, the consultant identified the various GIIPs like World Bank operational policies relevant to the project. Some of these policies include Operational Policy (OP) 4.01, OP 4.12, as well as the World Bank Policy on Access to Information, 2010 as well as the World Bank Guidance Notes on Gender Based Violence (GBV), Guidance Notes on Sexual Exploitation and Abuse (SEA).
- Assembly and review of baseline data, maps, reports and any relevant information on the existing environmental and social conditions of the Project Area influenced by the proposed development
- Review of existing legislation, regulation and policies relevant to the proposed Project;
- Preparation of checklists that consist of a simple catalogue of environmental factors which are compared to the activities to be developed.
- Early meetings with the Client to deliberate on the proposed project, keeping in mind the site and activity options under consideration;

Field Investigations

Activities implemented during field investigations involved;

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

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

POSITIVE IMPACTS

The major beneficial long-term impact of the project will be: -

- Proper infrastructure in preparation for improved irrigation water supply to lower Sabor
- Increased productivity.
- Increase household income;
- Increase food security;
- The program will contribute to increase in local development and employment as the local population are likely to be employed during the construction phase and after construction due to water related investments;
- Increase in land value within the project area, due to availability of irrigation water.
- Employment creation will be the key positive environment impact as operation and maintenance personnel will be required for the rest of the project life. This could potentially generate positive gender empowerment impacts. The availability of water and easy access will trigger other developments and businesses.

NEGATIVE IMPACTS

The potential negative impacts during construction are generally short-term, temporary and reversible impacts which can be reduced or eliminated by mitigation. Many of the impacts will only occur at active construction sites and therefore move with the works such that many locations will only be impacted for a couple of days rather than the duration of the project.

CONSTRUCTION IMPACTS

The potential negative and significant environmental and social impacts are confined to the construction period and in mainly during the excavation of the trenches and pipe laying for the vast majority of locations which will however not last longer than a 3-5 days.

Direct minor, localized short-term adverse impacts such as noise, dust, public safety, traffic disruption, interruption of utilities, disposal of waste, occupational health and safety, and social impacts will be mitigated and generally eliminated due to the short term and localized nature of the impact. This will be achieved by strict observance of Kenya's environmental and social laws and regulations and World Bank environmental and social safeguards policies.

- **Archaeology and cultural resources**: No listed sites are affected; chance finds will be notified to National Museums of Kenya (NMK) whose decision will ensure no residual impact.
- **Aquatic ecology:** There is slight potential for impacts of the project on surface water bodies and aquatic resources. There are surface water bodies on the project area of influence.
- **Terrestrial ecology:** Potential impacts are insignificant and further mitigated by procedures set out in the ESMP regarding restoration of vegetation on completion of construction. There are no unique terrestrial flora and fauna along the project routing. Project area is mostly rural farms the pipeline traverses' rural areas, the routing is along the roadsides with little or no terrestrial ecology of sensitivity of significance.
- **Water resources:** Potential impacts are minor and mitigated to zero by control of works contractors' methods of working and use of water. There are no water resources (Surface) along the project routing likely to be affected by the project.
- **Hydrological regime and flooding:** Potential minor impact from the works affecting roadside drainage, works contractors are required to maintain drainage at all times and restore to its original condition or better upon completion of works at each location.
- **Water pollution (surface and groundwater):** Potential impact from accidental spillage, concreting operations, worker sanitation is insignificant. There are no water resources (surface) along the project routing likely to be affected by the project.

- **Erosion and sediment:** Potential impact from erosion of bare ground is minimal and localized and to be mitigated by procedures set out in the ESMP that forms part of this report.
- **Air quality:** Potential impact from dust and exhaust emissions is minor due to the use of hand-held equipment, and in-frequent use of generators (standby) and mitigated by requirement that works contractors comply with National Environment Management Authority (NEMA) requirements for air quality. Most of the construction will be via manual labor using hand held equipment hence impact significance is low.
- **Noise and vibration:** Potential localized impact from noise of construction work and machinery where works are carried out is minor due to the use of hand-held equipment. Impacts mitigated by contractual requirement for works contractors to observe compliance with Kenya's standards for noise limits as well as Environment, Health and Safety (EHS) Guidelines for World Bank Group. Most of the construction will be via manual labor using hand held equipment hence impact significance is low.
- **Waste and hazardous waste:** Potential impacts from indiscriminate and uncontrolled disposal. Contract provides for control and approval of disposal of inert waste. Additional provisions are included for hazardous waste, and small random quantities of highly hazardous material which may need to be disposed.
- **Traffic control:** There will be no significant impact because works will not be carried out within rural areas. However, a Traffic Management Plan focused on minimizing traffic disruption and ensuring public and worker safety will be prepared.
- **Public safety:** Significant potential impact of accidents arising from active construction sites and activities within the community. Mitigation will be provided by high standard and enforced Health and Safety Plans from the works contractors to ensure public safety including procedures should accidents still occur. Overall residual risks and impacts are minor.
- **Dust:** Potential significant impacts from dust where construction operations are undertaken. Mitigation includes dust suppression requirement under works contracts, watering fill, covering material, etc. such that residual impact is minor.
- **Spread of communicable diseases and HIV/AIDS infection:** There is potential impact from spread of HIV/AIDS, particularly from workers coming into the communities, which will be mitigated by measures including sensitization programmes for works contractor employees, Project Resident Engineer (PRE) employees and the communities.
- **Occupational health and safety risks:** Construction staff and project workers will be exposed to safety hazards arising from construction activities as well as risks to sexual harassment (SH) between workers. Provisions on SH will be integrated in employee's code of conduct (COC). All project workers will be required to sign COCs and undergo regular training on SH.
- **Sexual exploitation and abuse of community members by project workers:** This is a risk at all stages of the Project, especially when employees and community members are not clear about prohibitions against SEA in the Project. An SEA Action Plan will be developed in line with guidance from the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018).
- **Gender-based violence at the community level:** This impact refers to gender-based violence at the community level that women and girls may experience as a result of Project implementation. This includes, for example, an increase in intimate partner violence (IPV) when compensation schemes that share funds equally among husband and wife at the household level do not provide adequate sensitization and safety measures to reduce potential for increased tensions due to females receiving funds. This also refers to other GBV-related risks incurred as a result of project implementation that do not adequately consult women and adolescent girls in the community about safety and security issues related to the delivery of water and sanitation services.
- **Violation of children rights by contractor and labour force on site:** Child labour is prohibited. There is a risk of sexual exploitation of children, especially young girls. The contractor should

ensure the Code of Conduct addresses child protection and child rights; that all staff of the project must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behavior.

- **Labour Influx:** The project does not expect to have in-migration of workers from different areas since the works are mainly manual and require unskilled/semi-skilled labour. However, a Labour Recruitment and Influx Management Plan will be developed to manage associated impacts, including SH, SEA and GBV at the community level linked to labour influx.
- **Water and sanitation:** Potential impact from works contractor sanitation facilities causing pollution, mitigation under the contract will require proper sanitation facilities for workers which eliminates the impact.

OPERATIONAL IMPACTS

However, there will be adverse impacts during the operation phase (minimal) and they will be direct and minor, localized short-term adverse impacts such as noise, dust, public safety, traffic disruption, interruption of utilities, disposal of waste, occupational health and safety among others associated with repairs and maintenance operations and will be mitigated and generally eliminated due to the short term and localized nature of the impact. These will be experienced mainly during the maintenance and repair of the pipeline. The establishment of an adequate water distribution system will further be mostly beneficial to the local community, however with the provision of water comes the increase in the generation of solid and liquid waste

The life of such infrastructures (pipelines) is about 40-50 years. There will be no decommissioning of the project per se. Communities will still need irrigation water as population increases and the norm in the sector is not to decommission but continuously repair and replace old pipes. The project will augment, rehabilitate, expand, replace and renovate the facilities over the life of the project and even after the 40-50-year period. However, if they were to be decommissioned, before decommissioning, the contractor will prepare a decommissioning plan for the elements that will require decommissioning. Some of these pipelines if uncovered can have negative impacts on the health of those that come in contact with these materials.

Table 0-1. Summary of Negative Impacts

Water Supply Pipelines (Transmission and Distribution)				**Phase: Construction**
Issue	**Potential Impact**	**Impact Type and Rating**	**Extent**	**Duration**
Air pollution	Emissions from construction vehicles and equipment.	Direct, Minor	Local	Temporary
Noise pollution	Noise pollution from vehicles and construction equipment may cause nuisances to neighbouring communities.	Direct, Minor	Local	Temporary
Water pollution	Water pollution may result from: i) accidental spillage of fuels, lubricants and other chemicals. ii) siltation of water courses from runoff laden with sediment and dust. iii) high suspended solids from soil eroded from trenches (sediment run-off)	Direct, Minor	Local	Temporary
Soil erosion	Site clearance of vegetation and excavation works	Direct,	Local	Temporary

and contamination	using equipment may induce/accelerate soil erosion and siltation of water courses. Contamination may occur as a result of accidental or structural spillage of fuels, lubricant chemicals, sanitary wastewater, etc., as well as from leakage from inadequately protected solid waste storage facilities and sites. Soil may lose its fertility because of removal of topsoil. However, the project sites are in non-agricultural areas (peri-urban) hence soil erosion and implication on agriculture is minor.	Minor		
Solid waste generation	Vegetation and soil from excavation, construction waste material and packaging material may produce moderate quantities of waste.	Direct, Minor	Local	Temporary
Impacts on flora and fauna	Removal of vegetation may lead to potential habitat loss of its associated fauna.	Direct, Minor	Local	Temporary
Public health problems	Pools of stagnant water may be a source of water borne diseases especially if the trenches are left open (not back filled) over a long period of time.	Direct, Minor	Local	Temporary
Public Safety	Safety problems at the construction sites may arise from excavations, transportation and movement of equipment. Manually executed works expected to dominate the pipeline laying will take a longer construction time leading to prolonged safety risks such as falling into trenches. • Contractor to risk asses the project activities, develop and implement relevant C-ESMP which will include but not limited to: o An Occupational Health and Safety Management Plan o Waste Management Plan o Labour influx strategy o Contractors Code of Conduct, including provisions on VAC, SEA, and SH o Gender inclusivity strategy o Child protection strategy o GBV Action Plan, including: ▪ SEA Prevention and Response Strategy ▪ SH Policy ▪ GBV (at the community level) Mitigation Plan ▪ SEA Redress	Direct, Minor	Local	Temporary

	Mechanism ▪ SH Redress Mechanism o Employment plans o Occupational Health and Safety Plan o Traffic Management Plan o Decommissioning Plan o Hazard Material Management Plan o Emergency Response Plan; o Spoil management plan; o Grievance redress Mechanism; o Stakeholders engagement and communication plan; Ensure through routing training and induction to all workers and the community on the project risk and the controls developed to manage them; Ensure that all construction machines and equipment are in good working conditions and to manufacturer's specifications to prevent occupational hazards. Cordon off trenches and working areas with a reflective tape to ensure safety of pedestrians and provide crossing areas for access to cut off businesses and structures. Appointing experienced and trained occupational health and safety staff, first aiders and fire marshal on-site for the duration of the construction work. (both supervising engineer and contractor) Provide workers with adequate drinking water and breaks. Provide workers training on safety procedures and emergency response such as fire, oil and chemical spills, pipe bursts, and other serious water loss risks. Roads passing through population centers will be water sprayed to reduce dust. Work to minimize or altogether eliminate mosquito breeding sites. Provide a waste management plan Fence off the site with security to avoid			

	unauthorized access to the project site (s) and hence potential injuries.			
Visual amenities	Laying of pipelines may have a negative impact on aesthetics of the surroundings such as the soils from the trenches that will be dumped along the trenches	Direct, Minor	Local	Temporary
Disturbance and interruption of commercial and social activities	Improper laying of pipelines may cause traffic disruptions and congestion, resulting in temporary disturbance and interruption of commercial and social activities. It may also cause damage to infrastructure (roads, utility lines) and disruption of public services.	Direct, Minor	Local	Temporary
Socioeconomic disruption	Trenches for the pipelines may be dug in front of shops, displacing kiosks along road reserves and other properties which will affect their livelihood and incomes. Furthermore, influx of people in the area may cause alteration of culture and introduce behavioural changes.	Direct, Minor	Local	Temporary
Occupational health and safety	Workers may be exposed to occupational health and safety hazards from project activities such as: accidents in excavations during trenching; working with equipment; working under noisy conditions., working in confined spaces; lifting of objects; storage, handling and use of dangerous substances and wastes. Workers may also be potentially exposed to HIV and other sexually transmitted diseases.	Direct, Minor	Local	Temporary
Gender Based Violence on community	GBV constitutes acts of gross misconduct and are therefore grounds for sanctions, penalties and/or termination of employment. This impact refers to gender-based violence at the community level that women and girls may experience as a result of Project implementation. This includes, for example, an increase in intimate partner violence (IPV) when compensation schemes that share funds equally among husband and wife at the household level do not provide adequate sensitization and safety measures to reduce potential for increased tensions due to females receiving funds. This also refers to other GBV-related risks incurred as a result of project implementation that do not adequately consult women and adolescent girls in the community about safety and security issues related to the delivery of water and sanitation services.	Direct, Minor	Local	Temporary
Labour Influx	The Project is expected to stimulate minimal in-	Direct,	Local	Temporary

	migration.	Minor		
Violence against Children	Violence against Children (VAW) is defined as physical, sexual, emotional and/or psychological harm, neglect or negligent treatment of minor children (i.e. under the age of 18), including exposure to such harm,[1] that results in actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility, trust or power. This includes using children for profit, labor[2], sexual gratification, or some other personal or financial advantage. This also includes other activities such as using computers, mobile phones, video and digital cameras or any other medium to exploit or harass children or to access child pornography.	Direct, Minor	Local	Temporary
Sexual Exploitation and Abuse on community members	This impact refers to sexual exploitation and abuse committed by Project staff against communities, and represents a risk at all stages of the Project, especially when employees and community members are not clear about prohibitions against SEA in the Project.	Direct, Minor	Local	Temporary
Spread of communicable diseases and HIV/AIDS infections	In migration of people from different regions may lead to behavioral influences which may increase the spread of diseases such as Human Immuno-Deficiency Virus (HIV), Acquired Immune Deficiency Syndrome (AIDS) and other Sexually Transmitted Infections (STIs).	Direct, Minor	Local	Temporary
Operation				
Water pollution	Water pollution may result from spillage of fuel and lubricants during maintenance; waste disposal along damaged lines may also cause pollution.	Direct, Minor	Local	Temporary
Noise pollution	Noise generated from vehicles used during maintenance or from generators in case they are used to pump the water can be a nuisance to sensitive receptors.	Direct, Minor	Local	Temporary
Air pollution	This could be in form of emissions from maintenance vehicles	Direct, Minor	Local	Temporary
Solid waste generation	Solid wastes may be produced by maintenance works, especially where sections of pipelines are replaced.	Direct, Minor	Local	Temporary
Soil erosion and contamination	Inspection and maintenance works for the pipelines may require clearance of sites of vegetation, as well as the execution of excavation works, possibly using equipment. This may	Direct, Minor	Local	Temporary

[1] Exposure to GBV is also considered VAC.

[2] The employment of children must comply with all relevant local legislation, including labor laws in relation to child labor and World Bank's safeguard policies on child labor and minimum age. They must also be able to meet the project's Occupational Health and Safety competency standards.

	induce or accelerate erosion.			
Impacts on flora and fauna	Inspection and maintenance works may require the removal of the natural vegetation, leading to potential habitat loss of its associated fauna.	Direct, Minor	Local	Temporary
Nuisances and public health risks as a result of operational failures of the distribution network	Accidental ruptures and structural degradation of pipelines that may accrue from ageing and poor maintenance, accompanied by low pressure in the pipes may allow the intrusion of potentially polluted groundwater into the drinking water distribution system. Ruptured pipes may also cause flooding and if the water stagnates, this may pose a risk of water-borne diseases.	Direct, Minor	Local	Long term
Occupational health and safety	Occupational health and safety problems may arise during maintenance of the pipelines. These may include: lifting of heavy and sharp objects and transportation of materials for maintenance, storage as well as handling and use of dangerous substances.	Direct, Minor	Local	Temporary
Local incapacity/ Inexperience to manage the facilities	This will lead to poor operation and maintenance as well as deterioration of infrastructure as well as accidents due to lack of enough technical knowledge in safety requirements for equipment/machinery operation. Inadequate monitoring of environmental impacts of project activities.	Direct, Minor	Wide	Long term
Disturbance and interruption of commercial and social activities	Interference with commercial and social activities will be very low.	Direct, Minor	Limited	Temporary
Disturbance and interruption of commercial and social activities	Maintenance activities for the water distribution network may cause traffic disruptions and congestion, resulting in disturbance and interruption of commercial and social activities. Other infrastructure e.g. roads, sewer lines, drains may also be disrupted.	Direct, Minor	Limited	Temporary

Table 0-2. Mitigation of impacts related to operation of pipeline

Project component: Pipeline and reservoirs/storage tanks	
Construction phase	
Impact type	**Description of mitigation measures**
Air pollution	• Maintain vehicle and equipment according to manufacturers' specifications. • Use standard fuel and lubricants. • Avoid unnecessary car idling and switch off engines of vehicles

	and machinery while not in use • Sprinkle water to work areas to reduce and prevent dust during dry weather periods. • Clean access routes in surrounding area on a daily basis to prevent dust. • Collect and hold cleaning wastes (e.g. rags) in appropriate containers. • Workers who may unavoidably have to work in dusty workplaces should be provided with nose and ear masks to protect them from excessive dust.
Noise pollution	• Minimise noise according to NEMA, Kenyan standards and World Bank guidelines. • Control noise and vibration on site. • Work programmes should be provided to local communities (e.g. through the local radio (FM) stations) and strictly followed. • Maintain vehicle and equipment according to manufacturers' specifications. • Install adequate noise prevention devices, e.g. mufflers on noise generating sources. • Switch off engines of vehicles and machinery while not in use. • Workers who may unavoidably have to work with noise generating equipment, e.g. earthmoving equipment should be provided with ear plugs and advised to put them on.
Water and soil pollution	• No solid waste, fuels or oils should be discharged into surface water bodies. • The contractor following the guidelines for management of materials and wastes during construction and operation should take care of preventing the project from damaging the surface water bodies. • Hold and store cleaning wastes in appropriate containers to be disposed of at approved sites. • Vehicles should preferably be parked on paved platforms. • Fuel storages should not leak, and should be periodically monitored, and repaired or replaced when necessary. • Maintain fuel and clean vehicles and equipment at workshops/sites with adequate leakage prevention (e.g. impermeable surface, settlers and oil separator).
Soil erosion and Contamination	• Remove and store topsoil in separate piles and reinstate after refilling of trenches, to enable natural re-vegetation. • The Contractor(s) should present procedures for, and ensure implementation of measures to protect soils from any accidental or structural contamination. These include: • Storing all hazardous, sanitary and cleaning wastes in facilities approved by NEMA. • Installing leak-proof fuel storages on concrete platform with gutters and grease separators, which are monitored periodically and repaired or replaced when required.

	• Strict enforcement and monitoring standard procedures for storing and handling hazardous wastes and raw material (e.g. fuel or chemicals). • Placing strong drums for oil storage on impermeable floors in the stores. • Parking vehicles on paved platforms whenever possible. • Ensuring that sites for cleaning, fuelling and maintaining equipment and vehicles should be able to prevent leakage (e.g. paved or with settlers). • Isolating contaminated soil and treating /disposing it off in a way that will depend on the contaminant type.
Solid waste generation	• The Contractor should prepare a Solid Waste Management Plan, which should contain: • An inventory of the types and quantities of waste to be produced. • The most appropriate waste management approach for each type of waste including details on (temporary) storage, transport and final destination of the waste. • An assessment of any opportunities for reducing solid waste generation, in particular of hazardous and undesirable (persistent and non-reusable) types of wastes. • The Contractor should maintain records of types, quantities, origin, (temporary) storage, transport and elimination/reuse of solid waste, and make these available to the works supervisor upon his request, as proof of proper waste management practices. • Any waste including excess soil should be disposed of at gazetted sites. The solid waste shall not accumulate on site, to cause odour, fly, or rodent problems. • Excavated soils should be reused as much as possible as filling material and should be contained after excavation. • Provisional material storage on site should be designed and undertaken in such a way as to ensure that soils and underground water are not polluted. • Use licensed recycling companies to externally recycle, recover or dispose of waste.
Impacts on flora and fauna	• Zone out working areas to reduce ecological destruction, • Restore disturbed natural sites through environmental rehabilitation; restoring top soils and (re-)introduce genetic species similar to those destroyed in order to re-establish the natural local ecology.
Public Safety	• Ensure that work sites (especially excavation works), have proper protection with clear marking of safety borders and signals and fence off all dangerous areas. • Inform neighbours about the construction programme in advance and adhere to it. • Confine access to restricted work sites (including those with operation of mechanical and electric equipment) to persons with permits. • Implement appropriate traffic plans with the help of local police when (partial) closure of roads is required.

Public health problems Including increased vehicular traffic	• Fill up all depressions to avoid pools of stagnant water may form in pits, holes and excavated ditches which can create suitable habitats for insect disease vectors such as mosquitoes which cause malaria. • Inform local communities about the construction programme in advance. • In case access roads have to be closed, inform local communities and road users in advance. • Use reflective signature to direct traffic to designated areas. • Use flag men/women to give directions to traffic. • Sensitise drivers to observe speed limits
Raw material use	• Consider environmental performance of suppliers of raw material in the selection process. • Explore ways of reducing raw material use. • Special emphasis should be made on raw materials that may be reused and/or recycled/recovered
Occupational health and safety	• Ensure that work sites (especially excavation works), especially in the night have proper protection with clear marking of safety borders and signals and fence off all dangerous areas. • Carry out training of staff in EH&S monitoring and evaluation. • The contractor should recruit H&S person during construction. • Inform neighbours about the construction programme in advance and adhere to it. • Confine access to restricted work sites (including those with operation mechanical and electric equipment) to persons with permits. • The contractor will ensure clear human resources policy against sexual harassment that is aligned with national law • The contractor will integrate provisions related to sexual harassment in the employee COC • The contractors will ensure appointed human resources personnel to manage reports of sexual harassment according to policy • The contractor will ensure comply to provisions of Work Place Injuries and Benefits Act (WIBA) 2007 • Provide sex-segregated clean toilets for male and female workers • Undertaking training and capacity building for all workers on use of chemicals • Provide PPE to all workers using chemicals.
Disturbance and interruption of commercial and social activities	• Inform local communities about the construction programme in advance and adhere to it. • In case access roads have to be closed, inform local communities in advance. • Clean and maintain access roads in the neighbourhood of earth and sand on a daily basis. • Provide temporary access ways with the approval of local authorities where access roads are closed. • Carry out work under mild weather; avoid strong rains or winds. • Reduce obstruction of access to and use and occupation of roads,

	footpaths and bridges. • Protect any items and/or sites of archaeological or cultural value discovered during works with the aid of the appropriate authorities. • Where livelihoods and property are affected, valuation and prompt compensation be undertaken for the PACs
Disruption of social order and prevention of HIV/AIDS and other sexually transmitted diseases	• Sensitise all workers to ensure awareness of and sensitivity to the local cultures, traditions and lifestyles, • Implement the HIV/AIDS impact mitigation plan that will involve providing a comprehensive range of services including the identification of possible HIV/AIDS cases, testing with pre- and post-counselling, the treatment of associated infections, referral of appropriate cases, education to promote better quality of life and promotion of precautions, provision of condoms and the application of HIV/AIDS occupational exposure policies. • Sensitize workers and the surrounding communities on awareness, prevention and management of HIV/AIDS through staff training, awareness campaigns, multimedia and workshops or during community barazas. • Provide information, education and communication about safe uses of drinking water. • Provide an on-site clinic to provide Voluntary Counselling and Testing (VCT) services to construction crew and provision of Anti Retroviral (ARVs) for vulnerable community members • Integrate monitoring of HIV/AIDS preventive activities as part of the construction supervision. Basic knowledge, attitude and practices are among the parameters to be monitored, and particularly on provision of condoms, status testing and use of ARVs, as well as sexual health and rights • Ensure safety of women and girls in provision of VCT services
Sexual Exploitation and Abuse of Community Members by project workers	□ Develop and implement and SEA action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018). □ The SEA action plan will include how the project will ensure necessary steps are in place for: o Prevention of SEA: including COCs and ongoing sensitization of staff on responsibilities related to the COC and consequences of non-compliance; o Response to SEA: including survivor-centered multi-sectoral referral and assistance to complainants; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level o Engagement with the community: including development of

	confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights; Management and Coordination: including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle blower protection; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points and trained community liaison officers.
Gender Based Violence at Community Level	Develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including: o effective and on-going community engagement and consultation, particularly with women and girls; o review of specific project components that are known to heighten GBV risk at the community level, e.g. compensation schemes; employment schemes for women; delivery of water supplies; etc. o Specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to compensation and employment; water services; etc Ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation.
Violence against Children (VAW)	Develop and implement a Children Protection Strategy that will ensures minors are protected against negative impacts associated by the Project. All staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behavior Children under the age of 18 years shall not be hired on site as provided by Child Rights Act (Amendment Bill) 2014
Labour Influx	Preparation of Influx Management Plan by contractor Preparation of Labour and Recruitment Plan by contractor Preparation of a "code of conduct for workers". This code of conduct will be signed and followed by all workers involved in the project.
Visual amenities	• Do not pile excavated soil to form high stockpiles for long durations, • Clean up the site upon completion of the work.

Environmental and Social Management Plan

The ESIA includes an ESMP which details the mitigation measures, environmental monitoring activities, institutional responsibilities, and environmental management capacity building. The relevant ESMP provisions are included in bid and contract documents. During construction, the Project Resident

Engineer (PRE) will closely monitor the works contractors' environmental performance and overall ESMP implementation.

Table 0-3. Environmental and Social Management Plan

PHASE/ IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	MONITORING INDICATOR	RESPONSIBILITY/BUDGET	MONITORING INSTITUTION
Construction Phase (waterworks,					
A1. Air pollution	Emissions from vehicles and construction equipment.	A1-1: Maintain vehicle and equipment according to manufactures' specifications. A1-2: Use standard fuel and lubricants.	-Record of repairs -Fuels and lubricants conforming to specifications	Contractor	NEMA, NIB and Supervising Engineer
		A1-3: Sprinkle water to work areas to reduce and prevent dust during dry weather periods.	-Record of water sprinkling	Contractor	NEMA, NIB and Supervising Engineer
		A1-4: Clean access routes in surrounding area on a daily basis to prevent dust.	Record of cleaning	Contractor	NEMA, NIB and Supervising Engineer
		A1-5: Collect and hold sanitary and cleaning wastes in appropriate container.	-Designated sanitary containers	Contractor	NEMA, NIB and Supervising Engineer
		A1-6: Workers who may unavoidably have to work in dusty workplaces should be provided with nose and ear masks to protect them from excessive dust.	-PPEs Distribution list/stores, percentage of workers using nose and ear masks	Contractor	NEMA, NIB and Supervising Engineer
A2. Noise pollution	Intermittent noise from vehicles and equipment to sensitive receptors	A2-1: Minimize noise according to NEMA, Kenya standards and World Bank guidelines. A2-2: Control noise and vibration on site. A2-3: Install adequate noise prevention devices, e.g. mufflers on noise generating sources.	-Noise making machines/equipment fitted with mufflers -Record of noise measurements	Contractor	NEMA, NIB and Supervising Engineer
		A2-4: Maintain vehicle and equipment according to manufactures" specifications.	-Record of vehicle and equipment maintenance	Contractor	NEMA, NIB and Supervising Engineer
		A2-5: Switch off engines of vehicles and machinery while not in use.	-Equipment log sheets	Contractor	NEMA, NIB and Supervising Engineer

		A2-6: Provide information to the local communities (e.g. through the local system or local radio (FM) stations) with regard to work programme, and strict adherence to such.	-Receipts from radio stations for announcements made	Contractor	NEMA, NIB and Supervising Engineer
		A2-7: Workers who may unavoidably have to work with noise generating equipment, e.g. earth-moving equipment should be provided with ear plugs and advised/monitored to put them on.	-Store of PPEs including nose and ear masks	Contractor	NEMA, NIB and Supervising Engineer
A3 Water pollution	Water pollution from waste, dredging activities, accidental spillage of fuel, lubricants, sediment run-off	A3-1: Contain solid wastes so that no solid waste, fuels or oils should be discharged into surface water bodies.	-Monitoring reports on status of waste management	Contractor	NEMA, NIB and Supervising Engineer
		A3-3: Hold and store sanitary and cleaning wastes in appropriate containers to be disposed of at approved sites.	-Designated sanitary containers	Contractor	NEMA, NIB and Supervising Engineer
		A3-4: Park vehicles preferably on paved platforms A3-5: Fuel storages should not leak, and should be periodically monitored, and repaired or replaced when necessary. A3-6: Sites for cleaning, fuelling and maintaining vehicles should be able to prevent leakage (e.g. paved). A3-7: Maintain fuel and clean vehicles and equipment at workshops/sites with adequate leakage prevention (e.g. impermeable surface, settlers and oil separator).	-Monitoring reports on parking of vehicles and status of fuel storages	Contractor	NEMA, NIB and Supervising Engineer

		A-3-8. Cover backfill material when not used as backfill on same day; stop works when there is extreme rains leading to flooding;			
A4 Soil erosion and contamination		A4-1: Carry out work under mild weather (not strong rains or winds). A4-2: Contaminated soil should be isolated and treated/disposed of in a way that will depend on the contaminant type. A4-3: Remove and store topsoil in separate piles and reinstate after refilling of trenches, to enable natural revegetation. Cover backfill material when not used as backfill on same day; stop works when there is extreme rains leading to flooding;	-Stockpiles of topsoil -Written down soil protection measures and record of implementation -Results of chemical analysis of treated soils	Contractor	NEMA, NIB and Supervising Engineer
		A4-4: Storing all hazardous, sanitary and cleaning wastes in facilities approved by NEMA. A4-5: Installing leak-proof fuel storages on concrete platform with gutters and grease separators, which are monitored periodically and repaired or replaced when required.	-Monitoring reports, -Operational store	Contractor	NEMA, NIB and Supervising Engineer
		A4-6: Strictly enforce and monitor standard procedures for storing and handling hazardous wastes and raw material (e.g. fuel or chemicals).	-Monitoring reports	Contractor	NEMA, NIB and Supervising Engineer
		A4-7: Place strong drums for oil storage on impermeable	-Designated sanitary containers	Contractor	NEMA, NIB and Supervising Engineer

		floors in the stores. A4-8: Provide appropriate hoses for refuelling of pumps and vehicles.			
		A4-9: Parking vehicles on paved platforms whenever possible A4-10: Sites for cleaning, fuelling and maintaining equipment and vehicles should be able to prevent leakage (e.g. paved or with settlers).	-Monitoring reports on parking of vehicles and status of fuel storages	Contractor	NEMA, NIB and Supervising Engineer
		A4-11: Treat wastewater from maintenance workshops in oil separators before discharge to sewers.	-Reports on water quality analyses	Contractor	NEMA, NIB and Supervising Engineer
A5: Solid waste generation	Cleared vegetation may compromise aesthetic value of the sites;	A5-1: The Contractor should prepare a Solid Waste Management Plan, as described this report.	-Written down Solid Waste Management Plan (SWMP) and Implementation schedule	Contractor	NEMA, NIB and Supervising Engineer
		A5-2: The contractor should maintain records of types, quantities, origin, (temporary) storage, transport and elimination/reuse of solid waste A5-3: Any waste including excess soil should be disposed of at gazetted sites. The solid waste shall not accumulate on site, to cause odour, fly, or rodent problems.	-Records of types of wastes generated, transport and delivery to gazette sites	Contractor	NEMA, NIB and Supervising Engineer
		A5-4: Excavated soils should be reused as much as possible as filling material	-No visible soil stockpiles -Depressions filled	Contractor	NEMA, NIB and Supervising Engineer
		A5-5: Provisional material storage on site should be designed and undertaken in	-Sealed storage containers on site	Contractor	NEMA, NIB and Supervising Engineer

		such a way as to ensure that soils and underground water are not polluted.			
		A5-6: Use licensed recycling companies to externally collect and recycle, recover or dispose off waste	-Contracts with licensed waste disposal/recycling firms	Contractor	NEMA, NIB and Supervising Engineer
A6: Impacts on flora and fauna	Plants and associated fauna may be affected	A6-1: Zone out working areas to reduce ecological destruction.	-Zoned out areas	Contractor	NEMA, NIB and Supervising Engineer
		A6-2: Agree with and compensate owners of fruit and commercial trees	-Written agreement with the owners and indication the amount of money to paid for the compensation of the trees.	Contractor	NEMA, NIB and Supervising Engineer
		A6-3: Restore disturbed natural sites through environmental rehabilitation; restoring top soils and (re-)introduce genetic species similar to those destroyed in order to re-establish the natural local ecology.	-Disturbed sites restored after well completion	Contractor	NEMA, NIB and Supervising Engineer
A7: Public Safety	Excavations, and transportation of equipment, site workers and debris and movement of heavy equipment may pose a safety risk to the general public	A7-1: Ensure that work sites (especially excavation works), have proper protection with clear marking of safety borders and signals and fence off all dangerous areas	-Demarcated work sites and signals	Contractor	NEMA, NIB and Supervising Engineer
		A7-2: Inform communities about the construction programme in advance	-Written communication to neighbouring communities -Receipts from radio stations for announcement	Contractor	NEMA, NIB and Supervising Engineer
		A7-3: Confine access to restricted work sites (including those with operation of mechanical and electric equipment) to persons with permits.	-Security guards to restrict access	Contractor	NEMA, NIB and Supervising Engineer

		A7-4: Implement appropriate traffic plans with the help of local police when (partial) closure of roads is required	-A Traffic Management Plan	Contractor	NEMA, NIB and Supervising Engineer
A8: Raw material use	Quantities of construction material will be involved, for example, cement, steel, oil fuel, pipe materials (e.g. PVC, uPVC, concrete and/or steel). Also, large quantities of local materials, e.g. sand, gravel will be involved. If not well stored and utilized, as well as instituting management measures for waste materials, they can contaminate the environment	A8-1: Consider environmental performance of suppliers of raw material in the selection process. A8-2: Explore ways of reducing raw material use. A8-3: Special emphasis should be made on raw materials that may be reused and/or recycled/recovered.	-List of suppliers for raw materials -Records of raw materials used	Contractor	NEMA, NIB and Supervising Engineer
A9: Public health problems	Pools of stagnant water may form in pits, holes and excavated ditches which can create suitable habitats for insect disease vectors such as mosquitoes. People may fall in ditches and be injured	A9-1: Fill up all depressions to avoid pools of stagnant water that may form in pits, holes and excavated ditches which can create suitable habitats for insect disease vectors such as mosquitoes which cause malaria.	-All excavated potential depressions re-instated, filled and re-vegetated.	Contractor	NEMA, NIB and Supervising Engineer
		A9-2: Mark all dangerous areas and fence them off. A9-3: Restrict access to work areas by unauthorized persons	-All dangerous areas fenced off and warning signs -Written communication to Neighbouring communities -Security guards to restrict access	Contractor	NEMA, NIB and Supervising Engineer
A10: Spread of communicable diseases and HIV/AIDS infection	Spread of communicable diseases and HIV/AIDS infection	• Sensitize workers and the surrounding communities on awareness, prevention and management of	• Interview staff and community members • Training attendance lists	Contractor	NEMA, NIB and Supervising Engineer

		HIV/AIDS through staff training, awareness campaigns, multimedia and workshops or during community barazas. • Provide information, education and communication about safe uses of drinking water. • Provide an on-site clinic to provide Voluntary Counselling and Testing (VCT) services to construction crew and provision of Anti Retroviral (ARVs) for vulnerable community members • Integrate monitoring of HIV/AIDS preventive activities as part of the construction supervision. Basic knowledge, attitude and practices are among the parameters to be monitored, and particularly on provision of condoms, status testing and use of ARVs, as well as sexual health and rights • Ensure safety of women and girls in provision of VCT services • Provision of condoms, contraceptives and mosquito nets.	• Number of Trainings Held • Number of community members and workers in attendance in trainings		

		• Conduction of campaign meetings on transmission of diseases like HIV/AIDS and other STDs.			
A11: Occupational health and safety	Exposure of workers to occupational health and safety hazards from activities such as: excavations; working with heavy equipment; working under noisy conditions, working in confined spaces; lifting of heavy objects; storage, handling and use of hazardous substances and wastes.	A11-1: Ensure that work sites (especially excavation works), especially in the night have proper protection with clear marking of safety borders and signals and fence off all dangerous areas	-Written down Health and Safety Management Plan (HSMP) including the suggested mitigation measures with a HSMP Committee to oversee its implementation	Contractor	NEMA, NIB and Supervising Engineer
		A11-2: Inform riparian neighbours about the construction programme in advance.	Written communication to neighbouring communities -Receipts from radio stations for announcement	Contractor	NEMA, NIB and Supervising Engineer
		A11-3: Confine access to restricted work sites (including those with operation mechanical and electric equipment) to persons with permits.	-Presence of security guards	Contractor	NEMA, NIB and Supervising Engineer
		A11-4: Train NIB staff and contractor staff in Environment and Safety. • SH Policy • SH provisions in CoC • Discrete SH reporting pathway • The contractor will ensure that clear human resources policy against sexual harassment that is aligned with national law • The contractor will	-Presence of trained staff in E&S -Number of trainings for staff on SH -HR trained in SH -Number of fatalities and accidents recorded in the incidence book -Interview project staff and management -Compliance with SH provisions in CoC -Physical inspection -Training attendance lists -Documentation of	Contractor	NEMA, NIB and Supervising Engineer

		integrate provisions related to sexual harassment in the employee COC • The contractors will ensure appointed human resources personnel to manage reports of sexual harassment according to policy • The contractor will ensure comply to provisions of Work Place Injuries and Benefits Act (WIBA) 2007 • Provide sex-segregated clean toilets for male and female workers • Undertaking training and capacity building for all workers on use of chemicals • Provide PPE to all workers using chemicals.	fatalities and accidents		
A12: Sexual exploitation and abuse by project workers against community members	Sexual exploitation and abuse by project workers against community members	Develop and implement an SEA plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment	• Review monthly minutes from SEA coordination meetings • Interviews with staff and local community	Contractor	NEMA, NIB and Supervising Engineer

		Project Financing involving Major Civil Works (Sept 2018). The SEA action plan will include how the project will ensure necessary steps are in place for: • Prevention of SEA: including COCs and ongoing sensitization of staff on responsibilities related to the COC and consequences of non-compliance; project-level IEC materials; • Response to SEA: including survivor-centered coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management; • Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement	• Code of Conduct • Number of staff trainings • SEA FP • Community Liaison Officer trained in PSEA • IEC materials for workers sites and community • Discrete SEA reporting pathway • Relevant policies, e.g. investigations and discipline and whistle blower protection		

		activities; community-level IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights; • Management and Coordination: including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle blower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers.			

A13: Gender-based violence at the community level	Gender-based violence at the community level	The contractor will implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including: • Effective and on-going community engagement a consultation, particularly with women and girls; • Review of specific project components that are known to heighten GBV risk at the community level, e.g. compensation schemes for women, employments schemes for women, etc.; • Specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to compensation and employment The contractor will ensure adequate referrals mechanisms are in place if a case of GBV at the community level is reported related to project implementation • GBV Action Plan • Mitigation plan for GBV occurring at the	• Interview staff and community members • Liaise with other stakeholders • Training attendance lists • Documentation of SEA cases • Consultations with community members, women and girls • GBV Risk Assessment	Contractor	NEMA, NIB and Supervising Engineer

		community level as a result of project implementation • Discrete GBV reporting pathway • Number of GBV cases at the community level that receive survivor-centered referral and care			
A14: Violation of children rights by contractor and labour force on site	Violation of children rights by contractor and labour force on site	The contractor will develop and implement a Children Protection Strategy that will ensures minors are protected against negative impacts associated by the Project. All staff of the project must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behaviour Children under the age of 18 years should NOT be hired on site as provided by Child Rights Act (Amendment Bill) 2014	• Review of records • Interviews with staff and local communities • Record of employees including IDs • Number of cases reported involving abuse of children	Contractor	NEMA, NIB and Supervising Engineer
A15: Labour Influx	Labour Influx	The contractor will prepare the Labour Influx Management Plan as well as the Labour and Recruitment Plan Institution of a "code of conduct for workers". This code of conduct will be signed and followed by all workers involved in the		Contractor	NIB and Supervising Engineer

		project.			
A16: Gender empowerment	Gender empowerment	The contractor will mainstream Gender Inclusivity in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 Gender Rule. Ensuring equitable distribution of employment opportunities between men and women		Contractor	NIB and Supervising Engineer
A17: Increased vehicular traffic	Increase in the likelihood of accidents within and around the vicinity of works area.	A17-1: Inform local communities about the construction programme in advance. A17-2: In case access roads have to be closed, inform local communities and road users in advance.	Written communication to neighbouring communities -Receipts from radio stations for announcements	Contractor	NEMA, NIB and Supervising Engineer
		A17-3: Use reflective signature to direct traffic to designated areas. A17-4: Use flag men to give directions to traffic. A11-5: Install speed reduction humps at crossings of many people, e.g. at a school, market.	-Traffic Management Plan (TMP) in place -Record of vehicular accidents and incidents	Contractor	NEMA, NIB and Supervising Engineer
		A17-6: Sensitize drivers to observe speed limits	Sensitization reports		
A18: Visual amenities	Construction sites, if not well managed, have impacts on aesthetics of the surroundings with the possibility to affect the neighbouring residents.	A18-1. Do not pile excavated soil to form high stockpiles for long durations, A18-2: Clean up the site upon completion of the	Cleared and restored site	Contractor	NEMA, NIB and Supervising Engineer

		work.			
A19: Disturbance and interruption of commercial and social activities	Interference with commercial and social activities	A19-1: Inform local communities about the construction programme in advance. A19-2: In case access roads have to be closed, inform local communities in advance. A19-3: Clean and maintain access roads in the neighbourhood of earth and sand on a daily basis. A19-4: Provide temporary access ways with the approval of local authorities where access roads are closed. A19-5: Carry out work under mild weather (not strong rains or winds). A19-6: Reduce obstruction of access to and use and occupation of roads, footpaths and bridges. A19-7: Protect any items and/or sites of archaeological or cultural value (e.g. private graveyards) discovered during works with the aid of the appropriate authorities.	-Communication to neighbouring communities - Presence of access roads - Refer also to TMP A11-3 to A11-5 - Record of protection and/or compensation of items of cultural values	Contractor	NEMA, NIB and Supervising Engineer
A18: Disruption of social	Influx of people in the	A18-1: Sensitize all workers	Record of sensitization	Contractor	NEMA, NIB and

order	area may affect the local economy, cause alteration of culture and introduce behavioural changes	to ensure awareness of and sensitivity to the local cultures, traditions and lifestyles, A18-2: Implement the HIV/AIDS impact mitigation plan that will involve providing a comprehensive range of services.	sessions		Supervising Engineer
		A18-3: HIV/AIDS sensitisation, identification of possible HIV/AIDS cases, testing with pre- and post-counselling, the treatment of associated infections, referral of appropriate cases, education to promote better quality of life and promotion of precautions, provision of condoms and the application of HIV occupational exposure policies (this applies to the whole project cycle).	Receipts	Contractor	NEMA, NIB and Supervising Engineer
Loss of Iife, injury and damage to private property	Loss of Iife, injury and damage to private property	• Record of accidents and damages done	• Review of records • Interviews with staff and local community.	Contractor	NEMA, NIB and Supervising Engineer
Operation and Maintenance					
B1: Air pollution	Emissions from generators	B1-1: Same as in construction phase	Logs of maintenance schedules	SCHEME MANAGEMENT	NEMA
B2: Noise pollution	Intermittent noise from generators	B2-1: Same as in construction phase,	Logs of maintenance schedules	SCHEME MANAGEMENT	NEMA
B3: Solid waste generation	Little amounts of wastes generated during maintenance	B4-1: Same as in construction phase,	SWMP in place and implemented, neat premises	SCHEME MANAGEMENT	NEMA
B4: Impacts on flora and fauna	Little or no impact of flora and fauna	B5-1: Same as in construction phase		SCHEME MANAGEMENT	NEMA
B5: Occupational health and safety	Exposure of workers to occupational health and safety hazards during	B7-1: Same as in construction phase	Availability of protective wear, e.g. masks, helmets etc.	SCHEME MANAGEMENT	NEMA

	repair and maintenance Failure to achieve desired public health associated potable water supply	B7-2: Sensitize local communities about personal hygiene and cleanliness of water sources.	Use clean water containers for collecting water and home use		

Table 0-4.Environment and Social Monitoring Indicators

Project Activity/Aspect	Parameter	Indicator	Institutional Responsibility		Project Phase	Monitoring Cost Estimates (KES)
			Monitoring Responsibility	Frequency		
Impact of Flora	Visual Inspection	Bare soil Soil Erosion	Contractor Project Manager/Supervising Engineer	Not possible to monitor on a daily basis. Not possible to monitor on weekly or bi-weekly basis. Construction is completed in 3-5 days' time.	Construction and operation	Included in supervision scope and costs
Air emissions and quality of dust	TPS, SO_2,CO,H_2S,CO_2, Dust fallout	Bad Odour Use of PPE Health and Safety Plan in use Record of induction for workers Active dust suppression	Contractor Supervising Engineer	Not possible to monitor on a daily basis. Not possible to monitor on weekly or bi-weekly basis. Construction is completed in 3-5 days' time.	Construction and operation	Included in supervision scope and costs
Worker and public safety	Visual Inspection Incident and accident records	Induction training Safety working procedure Shoring and appropriate precautions in place	Contractor Supervising Engineer	Daily	Construction and operation	Included in supervision scope and costs
Occupation Health and Safety	Health and safety records Visual inspection	OHS Management system Active and passive monitoring Excellent workplace safety	Contractor Supervising Engineer	Daily	Construction and operation	Included in supervision Scope and costs

		culture Risk management				
Storage of hazardous materials and chemicals	Spillages Visual inspection	MSDS for all store Chemicals Functioning storage containers Chemical usage records	Contractor Supervising Engineer	Monthly Audit Review	Construction	Included in supervision scope and costs
Traffic concerns	Visual inspection	Prepare and implement **Traffic Management Plan** Banks men shall be used to direct vehicle traffic around construction sites and hazards during working hours (Health and Safety Plan). Plan approved by project manager barriers and signage	Contractor Supervising Engineer	Daily	Construction and operation	Included in supervision scope and costs
Public Awareness and Community perceptions		Grievance management records Evidence of Occurrence-Event report	Contractor Supervising Engineer	Monthly	Construction and operation	Included in supervision scope and costs
Noise	dB(A)	Measure included in design and procurement plans Hearing protection and PPE in use Record of equipment maintenance	Contractor Supervising Engineer	Not possible to monitor on a daily basis. Not possible to monitor on weekly or bi-weekly basis. Construction is completed in 3-5 days' time.	Construction and operation	Included in Supervision scope and Costs
Soil Erosion	Visual inspection	Bare soil Soil pillars	Contractor Supervising Engineer	Weekly	Construction and operation	Included in Supervision scope and Cost
Solid waste management	Domestic refuse, metallic scraps, sludge	Documented Approvals for placement of wastes, Comprehensive waste management plan	Contractor Supervising Engineer	Daily	Construction and operation	Included in Supervision scope and Costs

Construction Environment and Social Management Plan (C-ESSMP)

Construction Environment and Social Management Plan (C-ESMP) is an upgraded ESMP illustrating realities of the project works to be prepared by the Contractor. The Contractor is expected to finalize the Work Plan and upon approval, list the works items and for each item present practical actions that will be undertaken to realize achievement of the ESMP. The actions on works items should address environmental and social aspects associated with the works and in line with guidelines from the ESMP. Based on these ESMP outline, the Contractor will be instructed to develop a Construction Environment and Social Management Plan (C-ESMP) for each component of the project and submit these plans to the NIB Supervision team/project manager.

ESMP Implementation

For an effective integration of environmental and social safeguards into the project implementation the Contractor will need to adopt this ESMP and prepare a comprehensive Construction Environment and Social Management Plan (C-ESMP) that will provide the key reference point for compliance. The environmental supervision will also adopt the C-ESMP.

NIB Project Management Unit

The project implementation arrangements have been established under NIB. The core functions of the Team will be to coordinate and facilitate fiduciary oversight environmental and social safeguards supervision among others.

Project Supervision Engineer

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

a) Resident Engineer (1No.)
b) Administrator (1No.)
c) Environmentalist Specialist (1No.)

Contractor

The Contractor will ensure that the established safeguards are integrated and implemented throughout the project works as per the C-ESMP. The Contractor will internalize the ESMP/C-ESMP, prepare monthly progress reports and implement instructions issued by the Supervision Consultant. The Contractor will also undertake ESIA Studies for sites outside the project zone and seek appropriate NEMA Licenses. The Contractor, therefore, will engage qualified Environmentalist and Social Experts on full time basis to interpret the C-ESMP and advice on the implementation of the same, as well to the Counterpart Personnel for the Supervision Expert. The contractor will also recruit Community Liaison Officers (3) to assist with monitoring social risk at community level including SEA and GBV. The full Contractor's Team will comprise of the key staff cadres as specified in the Bidding Document.

National Environment Management Authority

The National Environment Management Authority (NEMA) is responsible for ensuring environmental compliance in the country and has an office in Uasin Gishu County with staffing who will further ensure that the ESMP is implemented as part of their mandate, functions and responsibilities. NEMA will undertake surveillance on the project implementation and review compliance performance based on the supervision monitoring reports.

Grievance Redress

Grievance redressal is a critical component of effective ESMP implementation. The purpose of GRM is to provide a forum to the internal and external stakeholders to voice their concerns, queries and issues with the project. Such a mechanism would provide the stakeholders with one project personnel or one channel through which their queries will be channeled and will ensure timely responses to each query. This will allow for trust to be built amongst the stakeholders and prevent the culmination of small issues into major community unrest.

The GRM will be accessible and understandable for all stakeholders in the project and for the entire project life. The GRM will be communicated to all relevant stakeholders and will also be applicable for any contractor that will occupy and/or use land during the construction and operations phase.

There will be a separate mechanism within the GRM that will be aimed at ensuring safely and confidentially while receiving complaints related to SEA and to GBV at the community level through a focal point system as well as anonymous complaints mechanism managed by the NIB.

1.0 INTRODUCTION

1.1 SABOR IRRIGATION FLOOD FLOW-WATER SUPPLY PROJECT

This Environmental and Social Impact Assessment Report has been prepared following a request by the Client- the Lower Sabor Community and NIB of the Republic of Kenya, to the consultants, to develop an Environmental and Social Impact Assessment Report and an Environmental and Social Management Plan (ESMP) for the proposed Lower Sabor Irrigation Development Project in Uasin Gishu County.

The proposed Lower Sabor irrigation development project will be located in Tembelio Location, Moiben Constituency in Uasin Gishu County. The flood flow-water intake will be in Elgeyo Marakwet county in river Sergoit where the water head is high enough to distribute water to lower sabor by gravity. The project is anticipated to cover 175 acres of land and to benefit about 700 farmer households distributed all over the area. The project is estimated to cost Ksh 250, 085,350.
The works will involve construction of flood flow-water intake, installation of water transmission/conveyance pipelines, distribution lines, domestic water pans and infield irrigation systems.
The project during its operation phase will involve growing of horticultural crops like passion fruit, tomatoes, onions, vegetables and other high value crops
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1.2 PURPOSE AND JUSTIFICATION FOR THE PROJECT

The Project aims at enhancing national food security through installation of gravity water abstraction system to lower the cost of production and increase the area under irrigation in Lower Sabor irrigation scheme by 375 acres thus meeting the food need of the community in the Lower Sabor area, its neighboring counties and Kenya at large.
With the climate change impact this project will help in building resilience in the community by moving from over reliance on rainfed agriculture to irrigated agriculture. This will cushion the farmers against stochastic weather conditions that in most cases leads to crop failure.

1.3 OBJECTIVES OF SABOR IRRIGATION PROJECT

The project is anticipated to cover 375 acres of land and to benefit about 700 farmers households distributed all over the area. The project is estimated to cost Ksh 250, 085,350.

The project during its operation phase will involve growing of horticultural crops like passion fruit, tomatoes, onions, vegetables and other high value crops.

1.4 OBJECTIVES OF THE ESIA

The objectives of the ESIA are as follows:

1. Objectively assess and evaluate environmental and social impacts that may arise as a consequence of implementing the project based on the engineering design.
2. Propose mitigation measures for the impacts that may arise.
3. Develop Environmental and Social Management and Monitoring Plan (ESMP and ESMoPs) for the irrigation water supply project.
4. Assist the National Environment Management Authority (NEMA), to decide on the implementation of the project.

1.5 PROJECT ACTIVITIES

The proposed works within the priority areas will include the following activities:

- **Site Preparation**

The construction phase of the project will include setting out the pipeline way leaves, ground clearing of vegetation within the pipeline way leaves, provision of cordons for the works.

- **Trenching works**

In order to lay the new pipelines, the contractor will dig trenches. The depth of the trench will vary depending on the pipe diameters but will not exceed 2m. Similarly, the width of the trenches will range between 1m and 2m to allow for safe working space for works to be conducted within the trenches.

- **Laying of Pipelines**

This will involve placing the pipelines, valves and connections within the trenches, and bending them where necessary.

- **Water Testing**

Following the laying of pipelines, the Contractor will test the water pipes to ensure flows within the pipelines and no leakages within the system.

- **Soil replacement on pipelines**

Following successful installation of the water pipes, the contractor will bury the new pipes and provide the necessary signage for the pipelines, valves and chambers. Cover vegetation including grass, lawns, and flowers will be replanted. In sections that were previously paved, the Contractor will repave these areas to the specifications of the respective road authority or individual satisfaction.

1.6 RAW MATERIALS

The proposed project materials based on the design report will include among others:

i. HDPE, Steel and uPVC pipes
ii. Steel valves, fittings and chambers
iii. Sand, Aggregate, Cement
iv. Water for Concrete works on the various chambers.
v. Timber
vi. Nails

The project works will not require the establishment of borrow sites or quarries for materials. All construction materials will be sourced from the local suppliers.

1.7 WASTES

The construction and operation activities are expected to produce minimal waste and spoil since any overburden removed from the site will be replaced after laying of the pipelines. The following are some of the wastes foreseen during the construction: -

- Spoil from land clearing and excavation works, mostly grass, roots, a few trees, road paving, cabro blocks, etc.
- Debris from construction and demolition works; (scrap materials, nails, bricks, concrete, timber, steel;

timber; plastic materials, existing surface dressing)
- Hazardous waste such as cement residue; oils, gases.
- Wastes from the sanitation facilities for the construction workers.
- Gaseous waste from combustion products from construction engines, welding gas, generator etc.

1.8 THE PROJECT PROPONENTS

- National Irrigation Board (NIB)

2.0 ESIA APPROACH AND METHODOLOGY

2.1 ESIA OBJECTIVES

The objective is to plan and prepare Project-specific ESIA and ESMP for Sabor irrigation development project whose intended purpose is to establish irrigation flood flow-water supply distribution from River Sergoi in the border of Uasin Gishu county and Elgeyo Marakwet county.

2.2 ESIA OVERALL APPROACH

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

- Project Description and Institutional Framework;
- Scoping Study;
- Environmental Baseline Study;
- Socioeconomic Baseline Study;
- Assessment of social and environmental impacts at different stages of project (pre-construction, during construction, operation and maintenance and cumulative;
- Identification and development of mitigation measures;
- Identification and development of sustainable development approaches; and
- Environmental and Social Management Plan.

The requirements of NEMA are stated in the Environmental Management and Coordination Act, 1999 (Section 2.3.1) and EIA/EA Regulations 2003 and as amended in 2015.

The study followed a typical Environmental and Social Impact Assessment Process as set out in this section. It follows a typical process of establishing the current baseline conditions, identifying specific environmental and social risks that need to be addressed, characterization of the effects the project will have and the impacts (positive or negative) they will result in, determination of significance of the issues identified, establishment of mitigation measures and monitoring measures, and finally proposals for management plans to ensure effective implementation of mitigation and management of the anticipated issues. The approach and methodology chosen ensures that World Bank safeguards policies, the Kenyan ESIA processes have been followed. This involved collecting data on the environmental and social situation, conducting consultations with stakeholders and data analysis.

2.3 SCOPING

An essential element of the ESIA is the environmental scoping study which was undertaken in accordance with the EIA/EA NEMA regulations. A Scoping Report for the project was completed 2018 and was included with the design stage ESIA.

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

2.3.1 Scoping Stage in ESIA Process

The scoping process is a discrete stage in the ESIA process which helps to define and highlight key issues to be

addressed in the terms of reference for the ESIA. Scoping is intended to be iterative and to allow for the scope of work to be amended in the light of new issues and information. This aspect is particularly relevant in the on-going project in which the final designs of the proposed projects are currently under preparation. This has advantages in that new issues which emerge during the course of the environmental studies can be incorporated into the final design through consultations.

2.3.2 Purpose of Scoping

The purposes of a Scoping Study include:

- Providing an overview description of the project development;
- Establishing the nature of the landscape, settlements and habitats served by the project;
- Identifying critical habitats that might be directly and indirectly affected by the project;
- Identifying the scale and nature of social issues associated with the Project both directly and indirectly;
- Alternatives suitable or considered; and
- Identifying areas that would require detailed studies during the ESIA process.

The multiple benefits from environmental scoping include, among others:

- Helping to provide environmental information about important effects of the project, including issues of particular concern to affected groups and individuals;
- Stimulating early discussion among the developer, environmental authorities, other interested parties and the public about the project and its environmental impacts;
- Making planning, management and assessment of resources required for the project more efficient and based on environmental studies;
- Identifying legislation or regulatory controls which may be relevant to the project and provide opportunities for the assessment of different management and control systems to be undertaken in parallel with the implementation; and
- Providing NEMA with information on proposed projects that may or may not infringe environmental regulations.

The Scoping Report was completed in June 2018. Multiple objectives were covered by this document. The following key issues were included in the Scoping Report:

- Identification of social, gender and health issues and potential beneficial and adverse environmental impacts related to proposed project activities, social and economic assessments during scoping were based on preliminary screening and public consultations;
- Assessment of ongoing or planned initiatives related to sanitation by other donors, NGOs and the GoK;
- Review of existing studies, environmental legislation, environmental and social quantitative and qualitative surveys and studies, including gender analysis and technical documents related to the sector;
- A preliminary assessment was undertaken of the legal and institutional framework as well as NEMA processing procedures to assist NIB to obtain the necessary approvals and licenses required for project advancement;
- Using a screening tool, the ESIA team carried out field observations to identify potential beneficial and adverse environmental and social impacts associated with the anticipated scope of engineering works, land acquisition and resettlement; sensitive ecological habitats; impacts on women and vulnerable groups; worker safety; and health issues;
- Assessment of preliminary environmental mitigation measures to be adopted by the sub-projects based on the application of a detailed scoping questionnaire covering project impacts in various sectors, characteristics of the environment, and review of possible mitigation actions;

- Lastly, the Scoping Report attempted to determine the significant environmental and socio-cultural issues that should be the focus of the ESIA, including potential beneficial and adverse impacts associated with several key issues, such as gender; land acquisition and resettlement; sensitive ecological habitats; impacts on women and vulnerable groups; human trafficking; worker safety; and health issues.

The interactions between the environmental scoping team and the engineers engaged in the feasibility design enabled feedback to enhance the design process and address potential adverse impacts. This ESIA builds upon the final designs and the Scoping Report.

2.4 LITERATURE REVIEW

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

- The Constitution of Kenya (2010
- Environmental Management and Coordination Act 1999
- Environmental (Impact Assessment and Audit) Regulations, 2003
- Environmental Management and Co-ordination (Water Quality) Regulations 2006
- Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009
- Environmental Management and Co-ordination (Waste Management) Regulations 2006
- Environmental Management and Coordination (Air Quality) Regulations, 2014
- Children's Act (2012)
- National Gender and Equality Commission Act (2011)
- Kenya National Human Rights Commission Act (2011)
- Employment Act
- The Physical Planning Act, 1996
- The Public Health Act (Cap 242)
- Occupational Safety and Health Act (OSHA), 2007
- The Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005
- Water Act 2016
- World Bank OP. 4.01
- World Bank Guidance Notes on Sexual Exploitation and Abuse (SEA)
- World Bank Guidance Notes on Gender Based Violence (GBV)

2.4.1 ENVIRONMENTAL BASELINE

The following approach was used in the environmental baseline data collection and analysis presented in this ESIA, with the focus particularly on issues with key impacts related to the water supply.

2.4.1.1 Desk Studies

The data in the environmental baseline comprised secondary data collected through review of literature and primary data which was collected through field site visit and transect walks on the project area.

The sources of secondary data included but are not limited to: feasibility study reports; ecological and socio-economic profiles for Uasin Gishu and Elgeyo Marakwet; other data of GoK Departments; and other available maps, related reports and documents. The data collection and review were conducted to:

- Collect documented data on all aspects of the project (e.g. physical, biological and socio-economic);
- Assess ongoing or planned initiatives related to water supply by other donors, NGOs, and the GoK;
- Review in detail any existing studies, environmental legislation, environmental and social quantitative and/or qualitative surveys and studies including gender analyses, and review of technical documents related to water supply;

2.4.2 Field Site Surveys

Site surveys started prior to the preparation of the Scoping Report and continued throughout the period of the ESIA studies. It involved visiting stakeholder institutions and making consultations with key community members in all the wards in Sabor area. The main objective of this activity was to carry out on-site field assessments of the expected effects of the planned developments on the physical, biological and socio-economic environment. During these surveys, interviews, measurements and the administration of questionnaires were carried out with key informants who included County Government and National Government staff, local leaders and community representatives. Details of each survey are explained in subsequent sections.

2.4.3 Flora and Fauna Surveys

The assessment of flora and fauna focused on the proposed work sites and their immediate surroundings. These were assessed by means of walks, interviews, and secondary data collection. Walks were undertaken at sites where various construction works have been proposed (along the project route). Interviews were conducted with both locals and key informants. Secondary data was collected through the use of appropriate maps and relevant literature. Other useful information collected included GPS locations, digital still camera records, and data sheets.

2.5 SOCIO-ECONOMIC BASELINE

The socio-economic baseline has been established from secondary data, consultations conducted and observations on-site. As far as has been possible the focus for the socio-economic baseline has been on data collection and observations in the beneficiary communities; and observations in the communities through which the pipelines pass but which may not benefit. Areas where key resettlement impacts are observed have been given less attention because they will be covered in depth by the separate RAP. This will avoid consultation fatigue' where people become tired of repeated consultations for the same projects.

2.5.1 Secondary and Primary Data

Secondary socio-economic data was obtained from books, reports, journals and other sources such as the County Integrated Development Plan (CIDP) for County Government of Uasin Gishu, County Environmental Outlook Uasin Gishu) Kenya National Bureau of Statistics Reports, Feasibility study report among others. Primary data was collected from key informants and consultations which included public barazas.

2.5.2 Formal Public Discussion

A component of the scoping activity included public consultative meetings which were held in the project area. The purpose of the meetings was to allow the general public, as well as interested and affected parties, to give their views on the proposed Project. Issues of importance for this report were those that related to the water and sanitation project. The meetings were held in accordance with the requirements of NEMA guidelines for conducting an ESIA. The specific objectives of this public consultations were to:

- Disseminate information on the proposed project;
- Collect views and issues to be considered in the scoping process and ESIA study;
- Evaluate perceptions about positive and negative impacts of the project; and

- Receive concerns about environmental impacts and other implementation problems such as communication strategy and avenues for participation in the project.
- Assessing GBV and safety risks awareness; and community's awareness of service providers.

The meeting was facilitated by NIB who took the responsibility of chairing the plenary sessions as well as managing expectations. Issues raised during the deliberations of this meeting were recorded and incorporated into the Scoping Report and also this ESIA.

2.5.3 Government Consultations

The purpose was to ensure consideration of the views of all potentially affected persons (men, women and children) within the wards that the pipeline route passes through. The consultations were done along the potential project route and sites and among residents within and in the vicinity of the project sites. The consultations took the form of public barazas. The objectives for these consultations were to:

- Collect primary information on the socio-economic situation of the people in the communities;
- Evaluate the level of awareness of the communities about the proposed project;
- Gather information on people's perceptions of projects they considered successful based on past experiences;
- Gather the communities' perceptions about the role of local beneficiaries in the proposed implementation of the proposed project; and
- Assess the level of awareness of communities on how the proposed project will impact them both environmentally and socially and find out any suggestions on avoidance or mitigation measures for the impacts based on past experience.

2.5.4 Community Consultations

In order to supplement the 2009 Census data additional surveys were conducted in selected communities during October 2019. The communities chosen were representative of the communities benefiting from the project. A 'Community Level Survey' was conducted through consultation with the representative members of the specific project beneficiary community. Using a survey questionnaire, questions were asked to the community representatives, who would then discuss, as necessary, and provide a response. Definitions were given and questions further defined if necessary, by the national social specialist.

2.6 DATA ANALYSIS

The purpose of data analysis was to identify impacts that would arise from the construction and operation of the proposed project. The significance of impacts was determined by combining the perceived frequency of occurrence of the source of the impact, the duration, severity, and spatial extent of the impact and the sensitivity of the area being impacted upon.

The analysis was aided by using a summary criterion and classification. Mitigation measures and Environmental and Social Management Plan (ESMP) was designed based on the understanding of the identified impacts coupled with the knowledge and collected information about the project sites.

2.7 IDENTIFICATION OF IMPACTS AND MITIGATION MEASURES

The primary tool for identification of impacts and mitigation was discussion among members of the ESIA team using expert judgment and consultations including recommendations from stakeholders. This records the rationale for the impacts and their potential significance, mitigation measures, residual impact and risk after mitigation, linked to relevant legislation, the construction contract requirements and the provisions of the ESMP. Impacts were identified from the environmental and socioeconomic baseline as affecting the receptors air, water,

land, flora and fauna and community. These were further categorized into construction and subsequent operational impacts. Impact assessments were also based on criteria developed from Kenyan legal standards and World Bank safeguards policies.

2.8 DETERMINATION OF SIGNIFICANCE

2.8.1 Overview

The assessment of the significance of impacts and identification of residual impacts has taken account of any incorporated mitigation measures adopted by the Project, and is largely dependent on the extent and duration of change, the number of people or size of the resource affected and their sensitivity to the change. The criteria for determining significance are specific for each environmental and social aspect and are reported within each impact assessment chapter but generally for each impact the magnitude is defined (quantitatively where possible) and the sensitivity of the receptor is defined. Generic criteria for defining magnitude and sensitivity are summarized below.

2.8.2 Magnitude

The assessment of magnitude will be undertaken in two steps. Firstly, the key issues associated with the Project have been categorized as beneficial or adverse. Secondly, the magnitude of potential impacts has been categorized as major, moderate, minor, or negligible based on consideration of the parameters such as:

- Duration of the impact – ranging from temporary with no detectable impact to continuing beyond decommissioning;
- Spatial extent of the impact – for instance, within the site, boundary to regional, national, and international;
- Reversibility – ranging from no change to permanent requiring significant intervention to return to baseline;
- Likelihood – ranging from unlikely to occur to occurring regularly under typical conditions; and
- Compliance with legal standards and established professional criteria - ranging from meets or exceeds minimum standards or international guidance to substantially exceed national standards and limits / international guidance. **Table 2-1** below outlines generic criteria for determining magnitude.

Table 2-1.Generic Criteria for Determining Magnitude

Magnitude (Beneficial or Adverse)	Description
Major	Fundamental change to the specific conditions assessed resulting in long term or permanent change, typically widespread in nature, and requiring significant intervention to return to baseline; exceeds national standards and limits.
Moderate	Detectable change to the specific conditions assessed resulting in non-fundamental temporary or permanent change.
Minor	Detectable but minor change to the specific condition assessed.
Negligible	No perceptible change to the specific condition assessed.

2.8.3 Sensitivity

Sensitivity is generally site specific and criteria have been developed from baseline information gathered. The sensitivity of a receptor will be determined based on review of the population (including proximity/numbers/vulnerability) and presence of features on the site or the surrounding area. Generic criteria for determining sensitivity of receptors are outlined in **Table 2-2.** Each detailed assessment will define sensitivity in relation to their topic.

Table 2-2.Generic Criteria for Determining Sensitivity

Sensitivity	Definition (considers duration of the impact, spatial extent, reversibility, and ability of comply with legislation)
High	Vulnerable receptor (human or ecological) with little or no capacity to absorb proposed changes or minimal opportunities for mitigation.
Medium	Vulnerable receptor (human or ecological) with limited capacity to absorb proposed changes or limited opportunities for mitigation.
Low	Vulnerable receptor (human or ecological) with some capacity to absorb proposed changes or moderate opportunities for mitigation
Negligible	Vulnerable receptor (human or ecological) with good capacity to absorb proposed changes or and good opportunities for mitigation

2.8.4 Impact evaluation and determination of significance

Impacts will be identified and significance will be attributed considering the interaction between magnitude criteria and sensitivity criteria as presented in the significance matrix in Table **2-3.**

Table 2-3.Impact Significance Matrix

Magnitude of Impact	Sensitivity of Receptors			
	Negligible	Low	Medium	High
Negligible	Insignificant	Insignificant	Insignificant	Insignificant
Minor	Insignificant	Minor	Minor	Moderate
Moderate	Insignificant	Minor	Moderate	Major
Major	Insignificant	Moderate	Major	Critical

For each aspect, the significance of impacts will be discussed before and after mitigation (i.e. residual impact). Impacts identified as having critical, major, or moderate significance based on the above approach are classified as significant impacts.

2.8.5 Approach to Mitigation and Management

The ESIA includes a description of the measures envisaged to prevent, reduce and where possible offset any significant adverse impacts on the environment. The identification of such measures is an iterative process which needs to be undertaken in parallel with the design to aid the incorporation of measures into the design during project development. Early adoption of appropriate mitigation will help reduce significant environmental impacts to a practicable minimum. Where feasible the following hierarchy of mitigation measures have been applied to reduce, where possible, the significance of impacts to acceptable levels:

- Mitigation / elimination through design;
- Site /technology choice; and
- Application of best practice.

As part of the ESIA approach, it is proposed that an Environmental and Social Management Plan (ESMP) be produced for each of the key stages of the development by the contractor. These plans essentially set the framework for the Environmental and Social Management System for the Project moving forward. The assessment of the significance of impacts and identification of residual impacts has taken account of any incorporated mitigation measures adopted by the Project, and is largely dependent on the extent and duration of change, the number of people or size of the resource affected and their sensitivity to the change. The criteria for

determining significance are specific for each environmental and social aspect and are reported within each impact assessment chapter but generally for each impact the magnitude is defined (quantitatively where possible) and the sensitivity of the receptor is defined.

3.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

This chapter sets out the standards to which the legal, policy and administrative framework within which the Project will be developed. It identifies the applicable lender requirements and national standards. For convenience and to demonstrate a systematic approach to identifying legal constraints, it has been structured around the broad topic areas set out in the World Bank safeguards policies as these comprehensively address the environmental and social risks that may be faced by the project. The ESIA will conform to the Kenyan legislative and regulatory framework and in line with the World Bank's safeguards policies and General Environmental, Health and Safety (EHS) Guidelines (2007). For the majority of disciplines, where there is a difference between national Kenyan standards and World Bank safeguard policies, the Bank policies will prevail.

3.1 CONTEXT

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

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

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

3.2 NATIONAL POLICIES AND LEGISLATION

Table 3-1. Summary of National Policies

Policy	Description
National Policy on Water Resources Management and Development (Sessional Paper No.1 of 1999).	The management of water resources in Kenya is guided by four specific policy objectives, namely: • Preserve, conserve, and protect available water resources and allocate it in a sustainable rational and economic way; • Supply water of good quality in sufficient quantities to meet the various water needs,

	including poverty alleviation, while ensuring the safe disposal of wastewater and environmental protection; • Establish an efficient and effective institutional framework to achieve a systematic development and management of the water sector; and • Develop a sound and sustainable financing system for effective water resources management, water supply and sanitation development.
The National Water Policy 2012 (Draft)	The Policy is built on the achievements of the sector reform commenced with the Water Act and based on the sector principles lined out in the National Water Policy 1999. On water resources management, the policy seeks the management of water resources along natural catchment/basin boundaries following the Integrated Water Resource Management approach. It aims to ensure a comprehensive framework for promoting optimal, sustainable, and equitable development and use of water resources for livelihoods of Kenyans through: • progressive restoration and protection of ecological systems and biodiversity in strategic water catchments; • increasing per capita water availability above the international benchmark of 1000 m. by 2030; • Maximizing use of trans-boundary water resources in coordination with other riparian countries; • Enhancing storm water management and rainwater harvesting; • Enhancing inter-basin water transfer in Kenya as a strategic intervention for optimized used of water resources; • Improving effluent waters treatment and recycling for use; • Ensuring sustainable groundwater resources for present and future generations; and • Developing a water management system which contributes to the protection of the environment.
Kenya Vision 2030	The Vision for the water and sanitation sector is “to

	ensure water and improved sanitation availability and access to all by 2030". Kenya is a water-scarce country with renewable fresh water per capita at 647 m3 against the United Nations recommended minimum of 1,000 m3. The water strategy aims to intensify Kenya's access to safe water and better sanitation using the national network of water services boards, and the private sector, where necessary. The water programmes will integrate both water and sanitation components, thereby ensuring simultaneous development of water and sanitation with the right pricing. This is expected to bring individual and social benefits that will outweigh the investment costs. In the vision, specific strategies will be introduced to raise standards of the country's overall water, resource management, storage and harvesting capability. Some of the flagship projects for water and sanitation include the rehabilitation and expansion of urban water supply and sanitation in the key satellite towns identified under the economic pillar.
The National Environment Policy, 2013	The goal of the policy is to ensure a better quality of life for present and future generations through sustainable management and use of the environment and natural resources. The objectives of the Policy are *inter alia* to: • Provide a framework for an integrated approach to planning and sustainable management of Kenya's environment and natural resources; • Strengthen the legal and institutional framework for good governance, effective coordination and management of the environment and natural resources; and • Ensure sustainable management of the environment and natural resources, such as unique terrestrial and aquatic ecosystems, for national economic growth and improved livelihoods. Some of the guiding principles in the implementation of the policy include: • **Environmental Right**: Every person in

	Kenya has a right to a clean and healthy environment and a duty to safeguard and enhance the environment; • **Right to Development**: The right to development will be exercised taking into consideration sustainability, resource efficiency and economic, social and environmental needs; • **Sustainable Resource Use**: Environmental resources will be utilized in a manner that does not compromise the quality and value of the resource or decrease the carrying capacity of supporting ecosystems; and • **Public Participation**: A coordinated and participatory approach to environmental protection and management will be enhanced to ensure that the relevant government agencies, county governments, private sector, civil society and communities are involved in planning, implementation and decision-making processes.
The National Environment Action Plan Framework 2009 - 2013	The NEAP framework recognizes that the high population growth rate and expansion of economic activities have caused pressure on water resources. This is expected to increase unless urgent measures are taken to boost supply and rationalise demand. Water resources are under pressure caused by soil erosion and siltation, water catchments destruction, low level compliance to water quality regulations, inefficient water use strategies, invasive alien species, uncontrolled sand harvesting and over-abstraction of water resources. The framework proposes such interventions as: • Implementation of soil and water conservation measures; Provision of incentives for conservation of water catchments • Enforcement of EMCA, 1999 and other subsidiary regulations • Enforcement of the Water Act 2002 and other related legislations; • Promotion of integrated water resource management; • Enforcement of EMCA, 1999 and other subsidiary regulations • Enforcement of the Water Act 2002 and other related legislations;

The National Land Policy (Sessional Paper No. 3 of 2009)	The overall object of the national land policy is to secure land rights and provide for sustainable growth, investment, and the reduction of poverty in line with the governments overall development objectives.
The Kenya National Biodiversity Strategy and Action Plan, 2000	The overall objective of the NBSAP is to address the national and international undertakings elaborated in Article 6 of the Convention on Biological Diversity' (CBD). It is a national framework of action for the implementation of the Convention to ensure that the present rate of biodiversity loss is reversed, and that present levels of biological resources are maintained at sustainable levels for posterity.
Economic Recovery for Wealth and Employment Creation Strategy 2006	The overall goal of the strategy is to ensure clear improvement in the social and economic wellbeing of all Kenyans; thereby giving Kenyans a better deal in their lives, and in their struggle to build a modern and prosperous nation. The key areas covered in the strategy are: • Expanding and improving infrastructure; • Reforms in trade and industry; • Reforms in forestry; • Affordable shelter and housing; • Developing arid and semi-arid lands, and • Safeguarding environment and natural resources.
Gender Policy 2011	The overall goal of this Policy Framework is to mainstream gender concerns in the national development process in order to improve the social, legal/civic, economic and cultural conditions of women, men, girls and boys in Kenya The policy provides direction for setting priorities. An important priority is to ensure that all ministerial strategies and their performance frameworks integrate gender equality objectives and indicators and identify actions for tackling inequality. In addition, each program will develop integrated gender equality strategies at the initiative level in priority areas. Within selected interventions, the policy will also scale-up specific initiatives to advance gender equality **Relevance** This policy will be referred to during Project implementation especially during hiring of staff to be involved in the project, procuring of suppliers

	and sub consultants and sub-contractors to the project.
HIV/AIDS Policy 2009	The proposed project is to be implemented in the rural area, these areas have high freelance cases of HIV and Aids. This policy shall provide a framework to both the project proponent and contractor to address issues related to HIV and Aids. In summary, the policy provides a mechanism for: • Setting Minimum Internal Requirements (MIR) for managing HIV and AIDS • Establishing and promoting programmes to ensure non-discrimination and non- stigmatization of the infected; • Contributing to national efforts to minimize the spread and mitigate against the impact of HIV and AIDS; • Ensuring adequate allocation of resources to HIV and AIDS interventions; • Guiding human resource managers and employees on their rights and obligations regarding HIV and AIDS. **Relevance** The Policy will be complied with during implementation of the Project, the Contract will in cooperate in tender document and implement HIV awareness initiatives during construction of the Project.

Table 3-2. Summary of National Regulations and Standards

Legislation/Regulation/ Standard	Provisions	Relevance to the Project/ License or Permit Required/ or Activity requiring regulation
The Constitution of Kenya (2010)	Provides for protection and conservation of the environment and ensuring ecologically sustainable development and use of natural resources; Mandates the State to: -Establish systems of environmental impact assessment, environmental audit and	Consultations and agreement is required with the community and County government before developments are executed; and

	monitoring of the environment; - eliminate processes and activities that are likely to endanger the environment; - utilize the environment and natural resources for the benefit of the people of Kenya; and - Encourage public participation in the management, protection and conservation of the environment. -Accords every person the right to a clean and healthy environment and where this is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress in addition to any other legal remedies that are available in respect to the same matter	
Environmental Management and Coordination Act 1999	Provides for protection and conservation of the environment, environmental impact assessment, and environmental auditing and monitoring.	An EIA of the potential interventions should be carried out and EIA License to be acquired before commencement of development
Environmental (Impact Assessment and Audit) Regulations, 2003	-Provides for the procedure for carrying out Environmental Impact Assessment (EIA) and Environmental Audit (EA). -Provides for the carrying out of an environmental audit study following commencement of project operations. -Provides for the contents of an EIA and an EA Report.	-The EIA to be carried out on the potential interventions should be carried out in accordance to the regulations. -An initial environmental audit should also be carried out in the first year of operation of the schemes.
Environmental Management and Co-ordination (Water Quality) Regulations 2006	-Provides for the protection of ground and surface water resources. -Provides the water quality standards for sources of domestic water. The drinking water quality standards regulations were drawn	-The quality of water at the potential new intakes must be within the specified range to be sources of domestic water.

	under section 147 of the Environmental Management and Coordination Act 1999. In accordance with the regulations, every person shall refrain from acts that could directly or indirectly cause immediate or subsequent water pollution and no one should throw or cause to flow into water resources any materials such as to contaminate the water. The regulation also provides for protection of springs, streams and other water sources from pollution. The following tables illustrates water quality standards established under these regulations.	
Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009	-Prohibits the generation of unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. -Provides for the maximum noise levels permissible in various environmental set ups such as residential areas, places of worship, commercial areas and mixed residential	-License to emit noise/vibrations in excess of permissible levels to be acquired if necessary. -Sound level limits of 55dB (day) and 35dB (night) to be observed during construction and operations.
Environmental Management and Co-ordination (Waste Management) Regulations 2006	-Provides for standards for handling, transportation and disposal of various types of wastes including hazardous wastes. -Requirements to ensure waste minimization or cleaner production, waste segregation, recycling or composting. -Provides for licensing of vehicle transporting waste. -Provides for the licensing of waste disposal facilities.	-Disposal of generated waste including soil, vegetation, boulders; and -Generation of hazardous wastes such as used oil and oily parts from construction machinery.

Environmental Management and Coordination (Air Quality) Regulations, 2014.	-Provides for ambient air quality tolerance limits. -Prohibits air pollution in a manner that exceed specified levels. -Provides for installation of air pollution control systems where pollutants emitted exceed specified limits. -Provides for the control of fugitive emissions within property boundary. -Provides for the control of vehicular emissions. -Provides for prevention of dispersion of visible particulate matter or dust from any material being transported. -Provides for acquisition of an emission license. Under the general prohibitions (Part II), section 5 states that no person shall act in a way that directly or indirectly causes immediate or subsequent air pollution. Among the prohibitions are priority air pollutants (as listed under schedule 2 of the regulations) that include general pollutants, mobile sources and greenhouse gases. Odours are also prohibited under section 9 of the regulations (offensive emissions). Emissions into controlled areas such as schools, hospitals, residential areas and populated urban centers are also prohibited. Part VII on occupational air quality limits by NEMA air emission regulations in section 29,	-Exhaust emissions from construction machinery. -Site clearance and excavation of foundations. -Transportation and disposal of spoil.

	states that an occupier of premises shall ensure that exposure of indoor air pollutants does not exceed the limits stipulated under the Factories and Other Places of Work rules or under any other law. Other sources are recognized at sections 32 and 33 are those arising from construction equipment and materials as well as particulate matter from demolitions of structures and buildings as well as stockpiled dry materials.	
The Physical Planning Act, 1996	-Provide for controls on the use and development of land and buildings in the interest of proper and orderly development of an area. -Requires that development permission be sought through a development application.	-Development of buildings and other infrastructure on land under the jurisdiction of County Government of Uasin Gishu
The Public Health Act (Cap 242)	-Provides for the prevention of the occurrence of nuisance or conditions dangerous/injurious to humans. -Provides that the relevant local authority shall take all lawful, necessary and reasonably practicable measures -: - for preventing any pollution dangerous to health of any supply of water which the public within its jurisdiction has a right to use and does use for drinking or domestic purposes (whether such supply is derived from sources within or beyond its jurisdiction); and - for purifying any such supply which has become so polluted, and to take measures (including, if necessary, proceedings at law)	-Generation of wastes during construction/rehabilitation of the water supply infrastructure; -Handling and storage of waste at the sites; and -Protection of water sources from pollution.

	against any person so polluting any such supply or polluting any stream so as to be a nuisance or danger to health.	
Occupational Safety and Health Act (OSHA), 2007	-Provides for the safety, health and welfare of workers and all persons lawfully present at work places. -Provides for the registration of workplaces. -Outlines safety requirements in use of machinery to prevent accidents and injuries.	-Construction sites require registration as a workplace; -Safety measures are required in use of tools and machinery on site; -Protection of the workers and general public with any form of interaction with the construction sites is necessary.
The Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005	-Rules provide for the maximum noise exposure levels for workers in places of work and for the provision of protective equipment for those exposed to high noise levels. -Provide that an occupier shall also institute noise reduction measures at the source of noise in the workplace.	-Use of noisy machinery at the construction sites will require provision of PPE to workers
Water Act 2016	-Provides that subject to the Land Act, 2012, land required for national public water works may be acquired in any manner provided by law for the acquisition of land for public purposes -Compensation on just terms shall be payable by the Government to the owner of the land on which any such works are constructed -Every person in Kenya has the right to clean and safe water in adequate quantities and to reasonable standards of sanitation -Provides that a permit is required for use of water from a water resource; -A person shall not, without	-Compensation will be necessary for sites acquired to construct water pipelines works

	authority conferred under this Act throw, convey, cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive matter or thing into or near to any water resource in such manner as to cause, or be likely to cause, pollution of the water resource -Provides for payment for water use as part of the permit conditions	
Sexual Offences Act, 2006	This Act of Parliament makes provision about sexual offences and aims at prevention and the protection of all persons from harm from unlawful sexual acts. Section 15, 17 and 18 focuses mainly on sexual offenses on minors (children).	The contractor is obligated to put in place mechanisms which are necessary or expedient in order to achieve or promote the objects of this Act, including for instance, a sexual harassment policy.
Children Act, 2001	This Act of Parliament provides safeguards for the rights and welfare of the child including the right to parental care, non-discrimination, education, religion, health care and protection from child labour and armed conflict, among others. The Act requires that in all actions concerning children, the best interests of the child shall be a primary consideration.	The contractor under this Project will be required to comply with provisions of the Act during Project implementation by ensuring that measures are in place to prevent violation of children's rights particularly protection from child labour.
National Gender and Equality Commission Act 2011	The over-arching goal for NGEC is to contribute to the reduction of gender inequalities and the discrimination against all women, men, persons with disabilities, the youth, children, the elderly, minorities and marginalized communities.	This Act will be applied during hiring of workforce on site.
Employment Act 2007	This Act of Parliament prohibits discrimination in labour relations, sexual harassment, forced labour and child labour. It obligates all employers with twenty or more employees to issue a policy	The contractor will be guided by the provisions of this Act on matters touching on equality of opportunities in employment, terms of service, age limit and prevention of sexual harassment in

	statement on sexual harassment.	the work place.
The Land Act 2012	-Mandates the Land Commission and other public officers to use the following guiding principles and values: -equitable access to land; security of land rights; - security of land rights; -sustainable and productive management of land resources; -conservation and protection of ecologically sensitive areas -provides for the conversion of private land to public land through compulsory acquisition, transfer, surrender or reversion of leasehold interest to Government; -Provides that just compensation shall be paid promptly in full to all persons whose interests in the land have been determined; and -Provides for the creation of a public rights of way (ROW) or wayleave by the National Land Commission.	-Conservation and protection of ecologically sensitive areas such as the river system, riverine areas, and other significant terrestrial habitats is required in development/rehabilitation of the water supply schemes; -Compulsory acquisition may be necessary if land owners are not willing to avail the land for development new infrastructure proposed for the water supply schemes; -Just compensation is required for all whose land will be acquired; and -Creation of ROW will be necessary where the potential water pipelines pass through private land.

3.2.1.1 National Air Quality Emission Standards

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

Table 3-3. Ambient Air Quality Tolerance Limits

Pollutant	**Time Weighted Average**			
		Industrial Area	**Residential, Rural & Other Area**	**Controlled Areas**
Sulphur oxides (SOX);	Annual Average	80 ug/m^3	60 ug/m^3	15 ug/m^3
	24 hours	125 ug/m^3	80 ug/m^3	30 ug/m^3
	Annual Average		0.019 ppm/50ug/m^3	
	Month Average			
	24 Hours		0.048ppm /125ug/m^3	

Pollutant	Time Weighted Average			
		Industrial Area	Residential, Rural & Other Area	Controlled Areas
	Instant Peak		500 ug/m^3	
	Instant Peak (10 min)		0.191 ppm	
Oxides of Nitrogen (NOX);	Annual Average	80 ug/m^3	60 ug/m^3	15 ug/m^3
	24 hours	150 ug/m^3	80 ug/m^3	30 ug/m^3
	Annual Average		0.2 ppm	
	Month Average		0.3 ppm	
	24 Hours		0.4 ppm	
	One Hour		0.8 ppm	
	Instant Peak		1.4 ppm	
Nitrogen Dioxide	Annual Average	150 ug/m^3	0.05 ppm	
	Month Average		0.08 ppm	
	24 Hours	100 ug/m^3	0.1 ppm	
	One Hour		0.2 ppm	
	Instant Peak		0.5 ppm	
Suspended Particulate Matter	Annual Average	360 ug/m^3	140 ug/m^3	70 ug/m^3
	24 hours	500 ug/m^3	200 ug/m^3	100 ug/m^3
	Annual Average		100 ug/m^3	
	24 hours		180 ug/m^3	
Respirable Particulate Matter (<10□m) (RPM)	Annual Average	70 ug/m^3	50 ug/m^3	50 ug/m^3
	24 hours	150 ug/Nm^3	100 ug/Nm^3	75 ug/Nm^3
PM2.5	Annual Average	35 ug/m^3		
	24 hours	75 ug/m^3		
Lead (Pb)	Annual Average	1.0 ug/Nm^3	0.75 ug/Nm^3	0.50 ug/m^3
	24 hours	1.5 ug/m^3	1.00 ug/m^3	0.75 ug/m^3
	Month Average		2.5	
Carbon monoxide (CO)/ carbon dioxide (CO_2)	8 hours	5.0 mg/m^3	2.0 mg/m^3	1.0 mg/m^3
	1 hour	10.0 mg/m^3	4.0 mg/m^3	2.0 mg/m^3
Hydrogen sulphide	24 hours	150ug/m^3		
	instant Peak	700ppb		
Total VOC	24 hours	600 ug/m^3		
Ozone	1-Hour	200 ug/m^3	0.12 ppm	
	8 hour (instant Peak)	120 ug/m^3	1.25 ppm	

Source-NEMA

Table 3-4. National Air Quality Standards for General Pollutants

Pollutant	Time Weighted Average	Property Boundary
Particulate matter (PM)	Annual Average	50 ug/m^3
	24 hours	70 ug/m^3
Oxides of Nitrogen (NOX);	Annual Average	80 ug/m^3
	24 hours	150 ug/m^3
Sulphur oxides (SOX);	Annual Average	50 ug/m^3
	24 hours	125 ug/m^3
Hydrogen Sulphide	24 hours	50 ug/m3
Lead (Pb)	Annual/24 hours	0.5 – 2.0ug/m^3
Ammonia	24 hours	100 ug/m^3

Source-NEMA

3.2.1.2 National Noise Emission Guidelines

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

Table 3-5. National Noise Guidelines

Zone	Maximum Noise level limits dB (A)		Time Frame
	Day	Night	
Places of worship	30	25	Day time: 6.01a.m – 8. 00p.m Night time: 8.01p.m – 6. 00p.m
Residential: 1. Indoors 2. Outdoors	35 40	25 25	
Mixed Residential (inclusive of Entertainment and commercial places)	55	45	
Commercial	70	70	
Silent arena	30	25	

Source-NEMA

Table 3-6. Noise Levels for Construction Sites

Facility	Maximum Noise level limits dB (A)		Time Frame
	Day	Night	

Health facilities, Educational Centres and homes of disabled	60	35	Day time: 6.01am- 10.00pm Night time: 10.01pm – 6.00am
Residential	60	35	
Industrial	85	65	
Commercial	75	50	

Source-NEMA

Table 3-7. Noise levels from a factory or a workshop (Continuous or Intermittent Noise)

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

Source-NEMA

N/B: Noise levels should not exceed a level of

- **I.** Factory/Workshops 85 dB (A)
- **II.** Offices 50 dB (A)
- **III.** Factory/Workshop Compound 75 dB (A)

Table 3-8. Maximum Permissible Noise level for Impact or Impulsive Noise

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

Source-NEMA

3.2.2 International Finance Corporation and World Bank Environmental, Health and Safety (EHS) Guidelines

These are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These General EHS Guidelines are used in addition to the local guidelines in order to provide mitigation measures for the various environmental and social impacts that will be identified in this report. The main EHS guidelines that will be used alongside local policies include:

3.2.2.1 Environmental Guidelines

These guidelines will govern the Contractor's activities during the construction of the pipelines and the construction works impacts on the physical environment. The guidelines include:

Air Emissions and Ambient Air Quality – which provide the air quality standards, limits and monitoring requirements for construction works. The guidelines incorporate WHO air quality guidelines on the major air pollutants expected from the Contractor's machinery and equipment. Baseline and annual air quality measurements should be taken to establish the impacts of exhaust from the Contractor's works.

Wastewater and Ambient Water Quality – These guidelines will be key particularly in the Resident Engineers Office and the impacts of wastewater generation and treatment before release into the environment, in order to prevent pollution of the surrounding physical environment. The guidelines call for monitoring of wastewater from the site through testing and inspections for which the Contractor will have to establish a plan for management and monitoring.

Table 3-9.Standards for Effluent Discharge into the Environment

Parameter	Max Allowable (Limits)
1,1,1-trichloroethane (mg/l)	3
1,1,2-trichloethane (mg/l)	0.06
1,1-dichloroethylene	0.2
1,2-dichloroethane	0.04
1,3-dichloropropene (mg/l)	0.02
Alkyl Mercury compounds	Nd
Ammonia, ammonium compounds, NO3 compounds and NO2 compounds (Sum total of ammonia-N times 4 plus nitrate-N and Nitrite-N) (mg/l)	100
Arsenic (mg/l)	0.02
Arsenic and its compounds (mg/l)	0.1
Benzene (mg/l)	0.1
Biochemical Oxygen Demand (BOD 5days at 20 oC) (mg/l)	30
Boron (mg/l)	1.0
Boron and its compounds – non-marine (mg/l)	10
Boron and its compounds –marine (mg/l)	30
Cadmium (mg/l)	0.01
Cadmium and its compounds (mg/l)	0.1
Carbon tetrachloride	0.02
Chemical Oxygen Demand (COD (mg/l)	50
Chromium VI (mg/l)	0.05
Chloride (mg/l)	250
Chlorine free residue	0.10
Chromium total	2
cis –1,2- dichloro ethylene	0.4

Copper (mg/l)	1.0
Dichloromethane (mg/l)	0.2
Dissolved iron (mg/l)	10
Dissolved Manganese(mg/l)	10
E. coli (Counts / 100 ml)	Nil
Fluoride (mg/l)	1.5
Fluoride and its compounds (marine and non-marine) (mg/l)	8
Lead (mg/l)	0.01
Lead and its compounds (mg/l)	0.1
n-Hexane extracts (animal and vegetable fats) (mg/l)	30
n-Hexane extracts (mineral oil) (mg/l)	5
Oil and grease	Nil
Organo-Phosphorus compounds (parathion,methyl parathion,methyl demeton and Ethyl parantrophenyl phenylphosphorothroate, EPN only) (mg/l)	1.0
Polychlorinated biphenyls, PCBs (mg/l)	0.003
pH (Hydrogen ion activity----marine)	5.0-9.0
pH (Hydrogen ion activity—non-marine)	6.5-8.5
Phenols (mg/l)	0.001
Selenium (mg/l)	0.01
Selenium and its compounds (mg/l)	0.1
Hexavalent Chromium VI compounds (mg/l)	0.5
Sulphate (mg/l)	0.1
Simazine (mg/l)	0.03
Total Suspended Solids, (mg/l)	30
Tetrachloroethylene (mg/l)	0.1
Thiobencarb (mg/l)	0.1
Temperature (in degrees celcius) based on ambient temperature	± 3
Thiram (mg/l)	0.06
Total coliforms (counts /100 ml)	30
Total Cyanogen (mg/l)	Nd
Total Nickel (mg/l)	0.3
Total Dissolved solids (mg/l)	1200
Colour in Hazen Units (H.U)	15
Detergents (mg/l)	Nil
Total mercury (mg/l)	0.005
Trichloroethylene (mg/l)	0.3
Zinc (mg/l)	0.5
Whole effluent toxicity	
Total Phosphorus (mg/l)	2 Guideline value

Total Nitrogen	2 Guideline value

Hazardous Materials Management - These guidelines will mainly govern the handling and disposal of hazardous materials.

Waste Management – All construction works are expected to produce one or more forms of waste. The laying of the pipelines will be no exception. Construction wastes and domestic wastes are expected from the Contractor's site as well as the camp. The Contractor will have to prepare a waste management plan using these guidelines that conform to the local legal framework provided in this chapter.

Noise – Use of several equipment and plant is bound to generate some level of noise, which are bound to have a negative impact on the surrounding environment and in particular sensitive receptors. These impacts will be short-lived during the construction and operation phase of the project, and if minimal mechanization is employed the impacts can be reduced further. The guidelines also provide the maximum noise levels which the Contractor should strive to adhere to. The guidelines also call for baseline and annual monitoring of noise generation within the Contractor's site to establish compliance to the guidelines and local regulation.

Table 3-10. Noise Level Guidelines

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

Source: IFC/WBG

Air- Use of several equipment and plant is bound to generate some level of air emissions, which are bound to have a negative impact on the surrounding environment and in particular sensitive receptors. These impacts will be short-lived during the construction and operation phase of the project, and if minimal mechanization is employed the impacts can be reduced further. The guidelines also provide the air emission levels which the Contractor should strive to adhere to.

Table 3-11. WHO Ambient Air Quality Guidelines

WHO Ambient Air Quality Guidelines 7,8		
	Averaging Period	Guideline value in mg/m3
Sulfur dioxide (SO2)	24-hour 10 minutes	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) 500 (guideline)
Nitrogen dioxide (NO2)	1-year 1-hour	40 (guideline) 200 (guideline)

Particulate Matter PM10	1-year 24-hour	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline) 150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter PM2.5	1-year 24-hour	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline) 75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

Source: IFC/WBG

Table 3-12: Ambient Air Quality Tolerance Limits

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

Pollutant	Time Weighted Average			
		Industrial Area	Residential, Rural & Other Area	Controlled Areas
Nitrogen Dioxide	Annual Average	150 ug/m^3	0.05 ppm	
	Month Average		0.08 ppm	
	24 Hours	100 ug/m^3	0.1 ppm	
	One Hour		0.2 ppm	
	Instant Peak		0.5 ppm	
Suspended Particulate Matter	Annual Average	360 ug/m^3	140 ug/m^3	70 ug/m^3
	24 hours	500 ug/m^3	200 ug/m^3	100 ug/m^3
	Annual Average		100 ug/m^3	
	24 hours		180 ug/m^3	
Respirable Particulate Matter (<10 m) (RPM)	Annual Average	70 ug/m^3	50 ug/m^3	50 ug/m^3
	24 hours	150 ug/Nm^3	100 ug/Nm^3	75 ug/Nm^3
PM2.5	Annual Average	35 ug/m^3		
	24 hours	75 ug/m^3		
Lead (Pb)	Annual Average	1.0 ug/Nm^3	0.75 ug/Nm^3	0.50 ug/m^3
	24 hours	1.5 ug/m^3	1.00 ug/m^3	0.75 ug/m^3
	Month Average		2.5	
Carbon monoxide (CO)/ carbon dioxide (CO_2)	8 hours	5.0 mg/m^3	2.0 mg/m^3	1.0 mg/m^3
	1 hour	10.0 mg/m^3	4.0 mg/m^3	2.0 mg/m^3
Hydrogen sulphide	24 hours	150ug/m^3		
	instant Peak	700ppb		
Total VOC	24 hours	600 ug/m^3		
Ozone	1-Hour	200 ug/m^3	0.12 ppm	
	8 hour (instant Peak)	120 ug/m^3	1.25 ppm	

Source: IFC/WBG

3.2.2.2 Occupational Health and Safety Guidelines

These guidelines are geared towards ensuring the safety of the staff on site and within the Contractor's camp. The guidelines with regards to occupational health and safety include:

General Facility Design and Operation – These guidelines will guide the Contractor's workspace. Being that the project area is in the Coast region of the Country, characterized by high temperatures the Contractor will have to provide suitable potable water supply for the staff, a clean eating area, suitable lavatories and showers, fire precaution measures (extinguishers and safety drills) and first aid services.

Communication and Training – This will provide for communication and training of staff and visitors to the site, to govern behavior within the site. This is necessary to ensure safety while operating within the site. The Contractor will need to employ a health and safety officer fulltime on site who will be in charge of ensuring safety and communication of safety within the site.

Physical Hazards – These guidelines will govern the exposure of the staff to physical dangers including deep trenches, noise, dust, welding, manual handling, work environment temperatures. The guidelines provide fall protection within the trenches and work hour limits (8 hours maximum).

Chemical Hazards - Chemical hazards represent potential for illness or injury due to single acute exposure or chronic repetitive exposure to toxic, corrosive, sensitizing or oxidative substances.

Personal Protective Equipment (PPE) - Personal Protective Equipment (PPE) provides additional protection to workers exposed to workplace hazards in conjunction with other facility controls and safety systems. PPE is considered to be a last resort that is above and beyond the other facility controls and provides the worker with an extra level of personal protection. The Contractor will have to provide the relevant PPE for staff on site for the different job descriptions. In addition, visitors to site will have to be provided with some minimal form of PPE during their visits.

Monitoring - Occupational health and safety monitoring programs should verify the effectiveness of prevention and control strategies. The selected indicators should be representative of the most significant occupational, health, and safety hazards, and the implementation of prevention and control strategies. The Contractor will have to employ a health and safety officer who will come up with an occupational health and safety monitoring program for implementation by the Contractor. In addition, the Contractor will provide a clinic and log of accidents and incidences on site as a control measure for ensuring health and safety.

Sexual harassment and women's empowerment - Women and men may be exposed to different physical and psychological hazards and risks at the workplace. In addition, exposure to the same risks may also impact women and men differently. To ensure continued improvement in workplace safety and health for women, gender differences must be taken into account in the design of OSH processes and preventive measures. To address gender disparities in OSH, gender integration should respond to the specific hazards and risks impacting women including sexual harassment and GBV.

3.2.2.3 Community Health and Safety Guidelines

These guidelines complement the environmental and occupational health and safety guidelines. However, these guidelines specifically address the impact of the project activities on the surrounding community. The guidelines involve the following aspects:

Water Quality and Availability – Some of the Contractor's activities will interfere with the water supply to some areas. In these cases, the Contractor should give prior notice to the residents on a schedule of interruption so as to assure planning.

Structural Safety of Project Infrastructure – All the project pipelines will be located within existing road reserves, as such open trenches may pose a risk to pedestrians. As such safety measures have to be taken into account. The Contractor will have to provide physical buffers such as cordons to prevent falls into the trenches, as well as safe crossing points across the trenches at suitable intervals to provide safe crossing. In addition, the Contractor should provide concrete barriers or similar to segregate motor traffic from the work space.

Traffic Safety – Due to the fact that the project area is located within an urban setting, the area has high vehicular traffic. As such the Contractor will have to provide a traffic management plan in order to ensure safety of motorists and other road users. The traffic management plan will include alternative routes for transport, concrete barriers to separate the work area from vehicles, a traffic controller to divert traffic and road signage.

Emergency Preparedness and Response – These are designed to deal with events and acts that are unplanned when a project operation loses control, or could lose control, of a situation that may result in risks to human health, property, or the environment, either within the facility or in the local community. Emergencies do not normally include safe work practices for frequent upsets or events that are covered by occupational health and safety. The Contractor will prepare a emergency preparedness and response plan, including training of staff, drills to gauge responses to preparedness, and communication with the local community in case of rinse.

GBV, SEA and the spread of HIV – Interactions both between the project staff and the host community, as well as among members of the community themselves, may enhance occurrence of GBV, SEA and the spread of HIV/AIDs due to changes in financial status resulting from availability of jobs and increased business opportunities or because of cultural contamination arising from immigration. The contractor will be required to put in place measures to arrest such ills including through training on the spread and prevention of HIV and AIDs, provision of robust, effective and gender sensitive dispute resolution mechanism in the event of GBV/SEA as well as linkages with local administration to facilitate arrests and evidence recovery in the event of criminal activities touching on GBV/SEA and child abuse.

3.2.2.4 Construction and Decommissioning Guidelines

These guidelines will govern the project components that will require decommissioning including the pipelines and camp. The Contractor will have to prepare a decommissioning plan for all these features taking into account the previous EHS guidelines mentioned above.

3.3 GOVERNANCE AND ADMINISTRATIVE STRUCTURE

The key administrative agencies that regulate water development and its environmental implications in Kenya, and which therefore have a key role in the EIA authorization process, include:

3.3.1 Ministry of Environment and Natural Resources

The Ministry of Environment and Natural Resources (MENR) mission statement and key objective is to facilitate good governance in the protection, restoration, conservation, development and management of the environment and natural resources for equitable and sustainable development.

Following the passage of the Environmental Management and Coordination Act (EMCA) 1999, now amended and referred to as EMCA (amendment) 2015, several administrative structures were established under the MENR. These include the National Environmental Council (NEC), National Environment Management Authority (NEMA), National Environment Tribunal (NET) the National Complaints Committee (NCC), and the Standard and Enforcement Review Committee (SERC).

3.3.2 Ministry of Agriculture and irrigation

The Ministry of Agriculture and irrigation mission statement is to improve the livelihood of Kenyans and ensures food security through creation of an enabling environment and ensuring sustainable natural resource management. It host NIB as an agency of the government.

3.3.3 National Environment Management Authority

NEMA is the administrative body that is responsible for the coordination of the various environmental management activities in Kenya. NEMA is also the principal government authority for implementing all environmental policies. NEMA is also responsible for granting EIA approvals and for monitoring and assessing activities in order to ensure that the environment is not degraded by such project activities.

3.3.4 National Environment Complaints Committee

The National Environmental Complaints Committee (NECC) is the body charged with the task of investigating complaints or allegations regarding the condition of the environment in Kenya and suspected cases of environmental degradation. The NECC also undertakes public interest litigation on behalf of the citizens in environmental matters.

3.3.5 Water Resources Authority

WRA is a state corporation, established under the Water Act 2016 and charged with being the lead agency in water resources management. Among other functions, WRA is responsible for issuing permits for water use. The Authority is the immediate former predecessor of the Water Resources Management Authority (WRMA).

3.3.6 County Environmental Committee (CEC) Member

The CEC shall be responsible for the proper management of the environment within the county for which it is appointed. The Committee also develops county strategic environmental action plan for five years.

3.3.7 National Environmental Department

The NED functions are to investigate any allegations or complaints against any person or against the Authority in relation to the condition of the environment in Kenya. NED may also on its own motion investigate any suspected case of environmental degradation and to make a report of its findings together with its recommendations to the Cabinet Secretary.

3.3.8 The National Environment Tribunal

The National Environment Tribunal (NET) has a number of functions, including to hear and determine appeals from NEMA's decisions; to adjudicate over actions relating to the issuance, revocation or denial of Environmental Impact Assessment (EIA) licences; to determine the amount of money to be paid under the Act; to decide upon the imposition of restoration orders; to give direction to NEMA on any matter of complex nature referred to it by the Director General; and in accordance with the Forest Conservation and Management Act, No. 34 of 2016, NET is mandated to make determination on any matter that remains unresolved after reference to the lowest structure of devolved system set out in the County Government Act under section 70.

3.3.9 County Government of Uasin Gishu

This is the County Government responsible for Uasin Gishu County, and was formed as part of the devolved government provided for in Kenya's new Constitution. The County Government of Uasin Gishu consists of the County Assembly and the County Executive, which is made up of several County Ministries. The County Government of Uasin Gishu functions include agriculture, health and sanitation, control of air and noise pollution, cultural activities, county transport, planning and development, implementation of national government policies on natural resources and environmental conservation.

3.4 INTERNATIONAL GUIDANCE AND STANDARDS

The ESIA has been completed with regard for international best practice, including the following:

- World Bank Group (2007a). EHS General Guidelines, including:
  - EHS Guidelines: Wastewater and Ambient Water Quality;
  - EHS Guideline: Air Emissions and Ambient Air Quality;
  - EHS Guideline: Occupational Health and Safety
  - EHS Guideline: Noise
  - EHS Guidelines for Water and Sanitation

- World Bank Guidance notes on Gender Based Violence and Sexual Exploitation and Abuse

3.5 INTERNATIONAL CONVENTIONS

Relevant international agreements, treaties and conventions that have a social and/or environmental aspect, to which Kenya is a signatory or has acceded to/ratified, are detailed in table below.

Table 3-13. International Conventions

Convention	Date Ratified/Acceded to
African Convention for the Conservation of Nature and Natural Resources (2003)	Ratified (12 May 1969)
Convention on Biological Diversity (1992)	Ratified (26 July 1994)
UNESCO Convention for the Protection of the World Cultural and Natural Heritage (1972)	Acceded to (1 May 1964)
Convention on the Conservation of Migratory Species of Wild Animals (1985) ■ The African-Eurasian Water-bird Agreement (AEWA). ■ The Agreement on the Conservation of African-Eurasian Migratory Water birds (AEWA).	Acceded to (26 February 1999)
Convention on Wetlands of International Importance (the Ramsar Convention 1971)	Only signatory
Convention on Persistent Organic Pollutants (2001)	Ratified (24 September 2004)
Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal (1995)	Acceded to (1 June 2000)
Bamako Convention on the Ban of the Import into Africa and the Control of Trans-boundary Movement and Management of Hazardous Wastes within Africa (1991)	Only signatory
Convention on Biological Diversity (2006)	Ratified (26 July 1994)
Convention on Climatic Change and the Kyoto Protocol (1997)	Ratified (25 February 2005)
Lusaka Agreement on the Cooperative Enforcement Operations Directed against Illegal trade in Fauna (1994)	Ratified (17 January 1997)
Nile Basin Initiative (1999)	N/A
Convention on the Elimination of All Forms of Discrimination against Women.	Ratified 1984
Optional Protocol to the Convention on the Elimination of Discrimination against Women	Adopted 1999
Convention on the Rights of the Child	Ratified 1990
Optional Protocol to the Convention on the Rights of the Child on the sale of children, child prostitution and child pornography	Signed 2000
Convention on the Rights of Persons with Disabilities	Ratified 2008
The African Charter on Human and Peoples‟ Rights (African Charter)	Ratified 1981
The African Charter on the Rights and Welfare of the Child	Ratified 1990
The Protocol to the African Charter on the Rights of Women in Africa (Maputo Protocol)	Ratified 2003
Worst Forms of Child Labour	Ratified 2001

4.0 PROJECT DESCRIPTION

The proposed project involves all the activities that will ensure delivery of flood flow-water irrigation water from River Sergoi in Elgeyo Marakwet to the final users in lower Sabor. These will include flood flow-water Intake, Mains transmission lines, reservoirs and distribution lines to finally deliver water to the farmers water pans or directly to the fields.

4.1 PROJECT DESCRIPTION

The project description below is based on the information provided by the proponent, design engineers and the site information collected by the environmental assessment team at the time of the assessment.

The Proponent has identified priority irrigation projects that will steer progress to achieving their strategic goals/mandates in irrigation and resilience building to climate change. The proponent proposed to harvest/abstracts raw flood flow-water from River Sergoi, which is about eleven (11) km from lower Sabor. The water will be transmitted and distributed to farmers by gravity.

The Proponent is also planning to build a community centre whose purpose will be to serve as an administrative office for the lower Sabor irrigation project

4.2 LOCATION OF PROJECT

The proposed Lower Sabor irrigation development project will be located in Tembelio location, Moiben Constituency in Uasin Gishu County.

Figure 4.1: Project area Location Map.

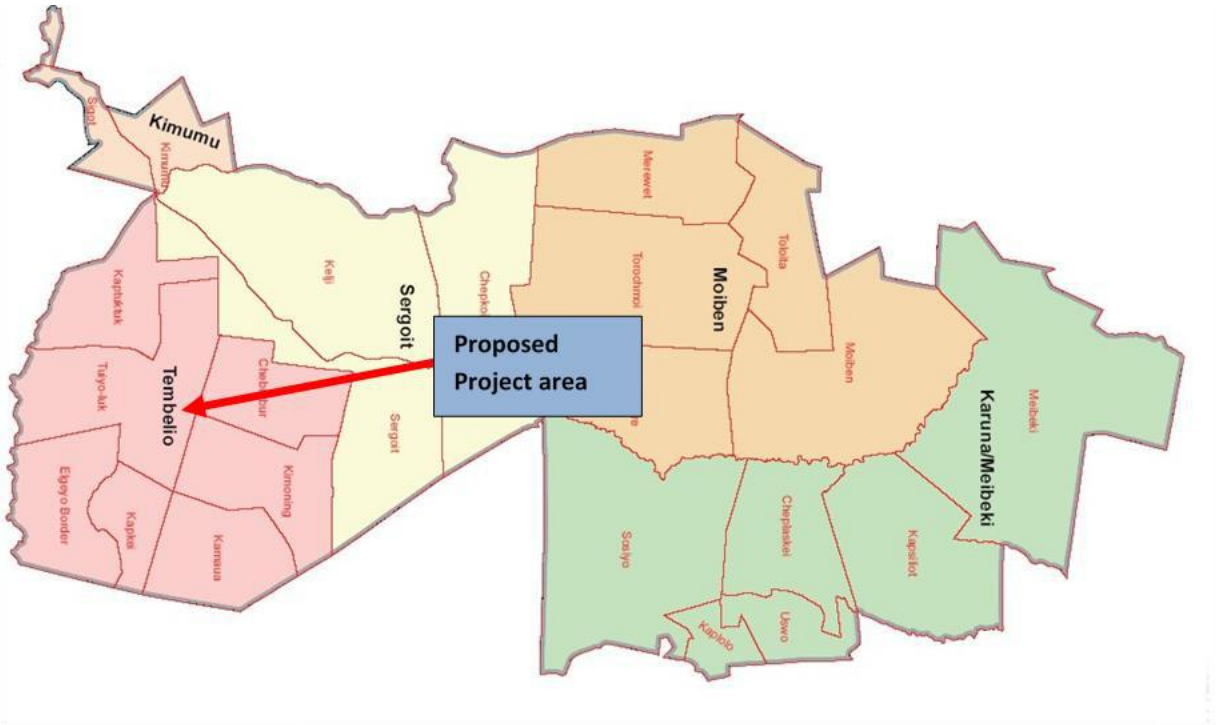


Figure 4-1. Location of Lower Sabor Irrigation

4.3 PROJECT DESIGN AND COMPONENTS

The description of intake, mains transmission lines, and distribution lines are described in detail below:

4.3.1 Flood Flow water intake

The project will draw its water from Chepkoilel River. This is a permanent river with a Q50=0.20m3/S, Q75=0.120m3/s and Q95=0.038m3/s .The project will abstract a maximum of 80% of flood flow i.e. 80% of Q50=0.16m3/s.
From survey: the highest scheme command point elevation=2407.965m
Cumulative head loss from spreadsheet =32.28m
Required water level in the river=2407.965+32.28=2440.245m
From survey: - River bed level=2476.667m
Required water level in river=2441.245m

Use weir height of 1.5m in order to ease water entry into sedimentation through intake orifice and provide head to drive water into main pipeline

Weir crest elevation = 2476.667 + 1.5= 2478.167m
The project will only abstract flood flow for storage to use during the 3 month dry season and based on the findings, there is adequate flood flow for irrigation and base flow to meet demands for the downstream users. There are two dams i.e. Chepkosom and Kisonei Dams with a combined capacity of 242,096 m3 which will provide the required 90 days storage during period of low flows in Chepkoilel River. The water flowing out the dams never dries up even during drought periods. The base flow of the water out of Chepkosom dam spillway is 0.026m3 /s whereas for Kisonei dam is 0.023m3/s. The two dams have a potential to hold a total of at least 650,971 m3 of water with a total continuous recharge from permanent springs of at least 0.049 m3/s and plans are underway to increase the capacity of the two dams to 650,971 m3.

4.3.2 Mains Transmission Lines

Wherever feasible, transmission lines will be located adjacent to roads or other existing RoW subject to pipeline diameter and exact pipe alignment. The pipe trench depths shall be as follow:

1. In areas where the pipe is subjected to vehicular traffic, the minimum depth of cover to be provided is 1.0 m above top of pipe
2. In other areas, the minimum depth of cover above top of pipe is 0.8 m; and
3. If the above depths cannot be obtained due to the natural ground profiles, concrete encasement for pipes will be considered.
4. Marker posts will be erected in order to indicate the location of the pipelines and appurtenances.

4.3.3 Distribution Lines

The principal components of the distribution networks shall be the primary, secondary and tertiary distribution mains. It is the primary and secondary mains, which shall be included under this project and will be constructed in a single stage. The minimum diameter of the primary and secondary mains will be determined from hydraulic analysis. Tertiary distribution mains are to be utilised as part of the house connection programmes and shall be constructed as and when appropriate.

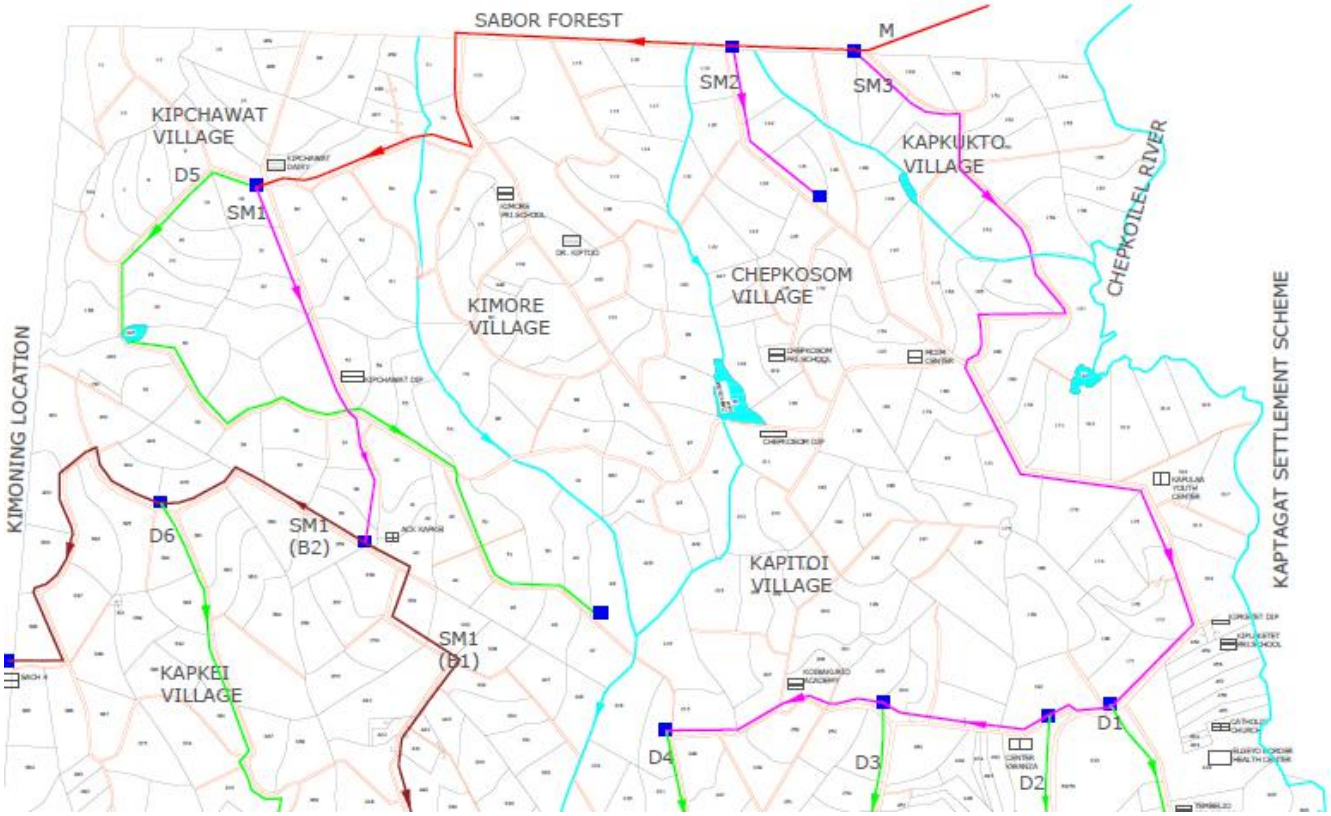


Figure 4-2. Map of Proposed New Distribution Pipelines

4.3.4 Primary pipelines

The main artery, the backbone of the system. The primary pipelines are selected based on the structure of the supply system. Diameter is not a selection criterion for primary pipelines. In general pipelines with a diameter of 300 mm and larger are primary pipelines but this varies per area. Primary pipeline: These form the backbone of the supply network.

4.3.5 Secondary pipelines

Pipelines with a diameter larger than 150 mm which are not part of the primary pipelines. Secondary pipeline: connection between the primary lines and the DMA's. These ensure minimal takeoffs from the primary lines, maintains network structure and ease of segmenting the network into smaller discreet areas. Pipe diameters range from 130 to 100 mm and pipes not classified as primary.

4.3.6 Tertiary pipelines

Pipelines with a diameter smaller than 150 mm. The scope of the design3 considers a minimum diameter of 60 mm. These pipelines often have a branched structure. Tertiary pipelines are only laid in accessible public roads. Tertiary pipeline: Pipelines providing final supply to the consumers. Diameters vary from 110 mm to 50 mm with a total length of approximately 14.5 km.

4.4 CONSTRUCTION EQUIPMENT

The construction (digging and laying of pipeline) will involve the use of the following equipment including quantities. The construction will entail almost 95% manual labour and use of manual implements (shovels, hoes and pick axes). The use of mechanized equipment will be limited as shown by the number of mechanized equipment required and cited in the bid documents as shown in table 4-1 below.

Table 4-1.Contractor Equipment

Description	Number in bidding documents
Excavators >0.5m3	2
Trucks > tonnes	2
Total Station and ancillaries	1
Pipe jacking equipment, > DN 200mm	2
Concrete Vibrators	3
Rock breaker	2
Back Hoe Excavator	1
Water bowser	1
Jack Hammer	3
Pipeline Pressure Testing Equipment	2
4WD Pick up	2
Compressor	2
Butt Fusion Equipment	2
Generator	1

Source: Bidding document

4.5 CONSTRUCTION METHODS

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

- Digging of trenching (using manual implements and limited motorized/mechanical equipment;
- Pipe laying;
- Covering of trenches
- Demolition of existing structures which could be on the proposed Right of Way (ROW) (most of structures on the ROW are mobile and temporary and will not require demolitions. However, pavements and perimeter walls of structures may be demolished and hence generate wastes.
- Concreting in certain sections where there will be construction of chambers. This will require cement, sand and masonry blocks. The quantities shall be minimal.

Figure 8 below shows the typical construction methods for laying of water pipelines which are mainly hand held implements which generate insignificant noise and air emissions. The stock pile is also limited and backfilled immediately. The truck used are normal truck and only supply pipelines when an area is completed with respect to trenching.

Figure 4-3. Typical construction and laying of pipeline

4.5.1.1 Construction Logistics

The construction and laying of the pipelines will be undertaken in the following step wise process and associated timelines.

Table 4-2. Construction Logistics and Step Wise Process

Activity	Timeline
Trenching/Digging of trenches	500 metres per day (estimate). 95% of the excavation is via manual implements including backfilling. Use of mechanical excavation is limited in sections determined by contractor to require the same.
Transport of Pipelines	2 trucks transport pipelines to project site only once a day based on distance trenched/excavated. They drop the pipes and return back to storage yard.
Laying of pipelines	Pipes laid on the same day based on excavated distance.
Covering trenches using excavated stockpile material	All trenched/excavated sections are covered back-filled same day. No backfill material is left overnight unless weather conditions do not allow i.e. heavy rains limiting backfilling. To minimise sediment run-off, when not possible to back fill all trenches on the same day, all the back-fill materials will be covered to minimise sediment run-off During extreme heavy rains works will be stopped as appropriate.
Stabilising pipeline	Excavated and backfilled area is stabilised immediately after the backfilling and if need be revegetation is undertaken.
Reinstating of excavated roads	If the roads are excavated, the reinstating happens same day. The project will use in most instance micro-tunnelling in order to avoid destruction of the roads.

4.5.2 Raw Materials and Waste

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

- Cement to be used in limited quantities when undertaking construction of chambers. There will be chambers, marker posts and anchor/thrust blocks that shall require cement, sand and masonry blocks. The quantities shall be minimal.
- Fine and coarse aggregate for concrete and reinstatement of roads, pavements and paved areas (if

destroyed during construction);

- PN 10 UPVC pipes
- PN 10 HDPE pipes
- PN 10 steel pipes
- Valves and penstocks;
- Water for concrete works
- Fuel for running motorized equipment.
- Steel valves and fittings
- Sand, aggregate, cement,
- The machinery excavation is expected to be limited to large diameter of more than 300 mm
- Soft gravel materials for beddings in cases where the ground is hard. (bedding materials from the local area).

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

The principal waste products expected during the construction phase include: -

- Excess excavated material (spoil). The quantities of excess spoil is expected to be very insignificant mainly because the depth of the trenches is 1 metre deep and hence spoil not significant and further, spoil material will be used as backfill.
- Excavated material which is not suitable for pipe bedding or backfill
- Spoil from land clearing and excavation works, mostly grass, roots, a few trees, road paving, cabro blocks, etc. These will be used as backfill unless determined to be inadequate where they will be disposed in a NEMA approved waste disposal site.
- Debris from construction and demolition works; (scrap materials, nails, bricks, concrete, timber, steel; plastic materials)
- Hazardous waste such as cement residue; oils, grease etc.
- Wastes from the sanitation facilities for the construction workers.
- Gaseous waste from combustion products from construction engines, welding gas, etc.

5.0 PROJECT ALTERNATIVES

5.1 INTRODUCTION

Analysis of feasible environmentally and socially sound alternatives for this project touches on several aspects including a no project development option, the water pipeline rehabilitation and construction intervention option, alternative sites for the pipelines, timing and scheduling and environmental classification alternatives.

5.1.1 The Project Option

The objective of the Project is to expand access to, and improve the reliability of, irrigation water supply in Lower Sabor , Uasin Gishu County in order to decrease crop failure due to drought and allow the community to invest in high value crops

5.1.2 No Project Development Option

The 'without project scenario' from a socioeconomic perspective would mean that the use of the site continues in a marginal manner since it was not developed with substantial underutilization of resources. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. Without the proposed project, the site would continue to be in the status quo.

a) Benefits of the alternative

a) The proponent will not incur the cost of putting up the infrastructure
b) Absence of environmental pollution associated with the construction.
c) Noninterference with Biodiversity
d) There will be no influx of people seeking employment during construction and operation phases of the project
e) Absence of occupational hazards associated with the construction and operations of the project

b) Demerits of the alternative

c) Loss of an avenue to create employment to the youth and the local population.
d) The project is expected to generate substantial revenue in terms of taxes to the government and give an overall boost to the GDP. These benefits would be lost in the absence of the project.

e) The current Kenyan and regional economy cannot afford these loses. This alternative was therefore the least favourable.

5.1.3 Alternative Site and technology

Alternative site would have been to site the proposed Lower Sabor Irrigation Development Project at a different site. The proposed construction and the whole project requires about 175 acres of land which is difficult to find in areas such as Uasin Gishi town. In addition, costs associated with acquiring such land would be enormous and therefore prohibitive.
Current site

Though the proponent already has land in Uasin Gishi, it may not be the best site since some residential settlements are present in the area. With appropriate mitigation measures, though, the operation of the proposed Lower Sabor Irrigation Development Project construction is not expected to significantly or adversely affect the immediate environment. In addition, the operation of the irrigation project would provide employment to some of anticipated inhabitants near the project site. Since the proponent already has the land community centre, costs associated with acquisition of alternative will be eliminated.

Use of pumps to convey water from another source

The proponent has proposed to convey water through gravity taking advantage of the general terrain of the area. An alternative that would involve pumping water will be expensive and unfriendly to the environment and as such will be unsustainable.
Use of stone and concrete technology

The proponent will employ a building technology that will involve the use of stone pipes and concrete wall. The structures will be put up based on the approved drawings and as per the specifications required by law that ensures that safety and other required standards are met.

Concern over environmental issues such as resource extraction for the building materials will be addressed by sourcing materials in less environmentally sensitive sites.
Putting up a building is a regulated venture by the National Construction Authority and as such the use of stone and concrete will be the viable option that will meet the required standards.

5.1.4 Alternatives Pipeline Material

Materials commonly used to construct water pipes include polyvinyl chloride (uPVC), cast iron, copper, steel and in older systems concrete or fired clay. Joining individual water pipe lengths to make up extended runs is possible with flange, nipple, compression or **soldered** joints. In this project, the use of concrete, cast iron and copper was considered but rejected.

The type of pipelines to be used will be polyvinyl chloride (uPVC) and galvanized pipe steel. This galvanized coating keeps the water from corroding the pipe. The project will also use High-density polyethylene (HDPE) or polyethylene high-density (PEHD) is a thermoplastic polymer produced from the monomer ethylene with a high strength-to-density ratio, HDPE is used in the production of corrosion-resistant piping.

5.1.5 Alternative Project Routes/Site

Alternative siting will involve rerouting the water pipeline network to other sites other than along road networks. This will be very costly for the proponent as it will require them to search and negotiate for land. It also does not make any economic sense not to take advantage of the land available along road networks clearly demarcated for such projects. The entire project cannot also be taken to another sub-

county in Uasin Gishu as this will be against the financial agreement for the project with the NIB. Thus, the project should be implemented as proposed.

6.0 ENVIRONMENTAL BASELINE

6.1 INTRODUCTION

This section describes the environmental baseline. The spatial extent of the project comprises Lower Sabor parts of Uasin Gishu County. With the river catchment in Elgeyo Marakwet county

6.2 PROJECT LOCATION

The proposed Lower Sabor irrigation development project will be located in Tembelio location, Moiben Constituency in Uasin Gishu County.

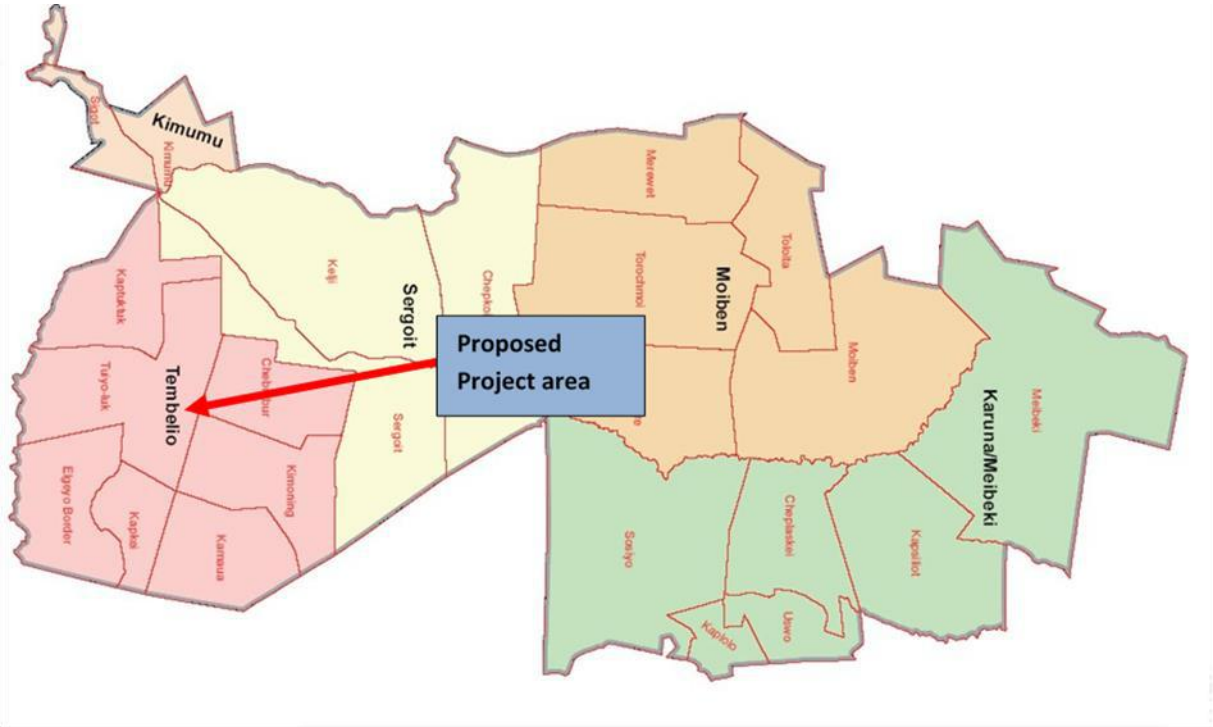


Figure 6-1. Administrative map of Uasin Gishu County

6.3 GEOLOGY AND SOIL

Uasin Gishu is endowed with good land resources and varied agro-ecological potential. It is the bread basket for the country; producing over 4.5m bags of maize and about 1m bags of wheat. Agriculture supports over 80% of the rural population of Uasin Gishu County in terms of household income and food security. However, the full potential of the County‟s agricultural production has not been realized.
The declining soil fertility due to continuous tilling of the same land coupled with overuse of fertilizers and chemicals are among the key factors leading to low crop production in the County. Uasin Gishu is in the Lake Victoria catchment zone and all the rivers in the district drain into Lake Victoria. Major rivers in the district include; Sosiani, Kipkaren, Kerita, Kipkuner Nderuget, Daragwa, Sambu, Moiben, Little Nzoia, Nzoia, Sergoit, Ellegerine and Endoroto

6.4 GEOLOGY

The agro-ecological zones are a direct consequence of the distribution and intensity of precipitation, and therefore they also reveal a constant dynamic regarding their boundaries. Due to a combination of

climatic, geological and topographical conditions, however, surface water on the plateau is scarce and confined mainly to a few rivers. In particular, evapotranspiration is intense and moisture deficits are widely experienced in the majority of years.

Uasin Gishu is in the Lake Victoria catchment zone and all the rivers in the district drain into Lake Victoria. Major rivers in the district include; Sosiani, Kipkaren, Kerita, Kipkuner, Nderuget, Daragwa, Sambu, Moiben, Little Nzoia, Nzoia, Sergoit, Ellegerine and Endoroto However the project area has no rivers but numerious surface water percolation sections which make the region a potential health hazard to water borne diseases.

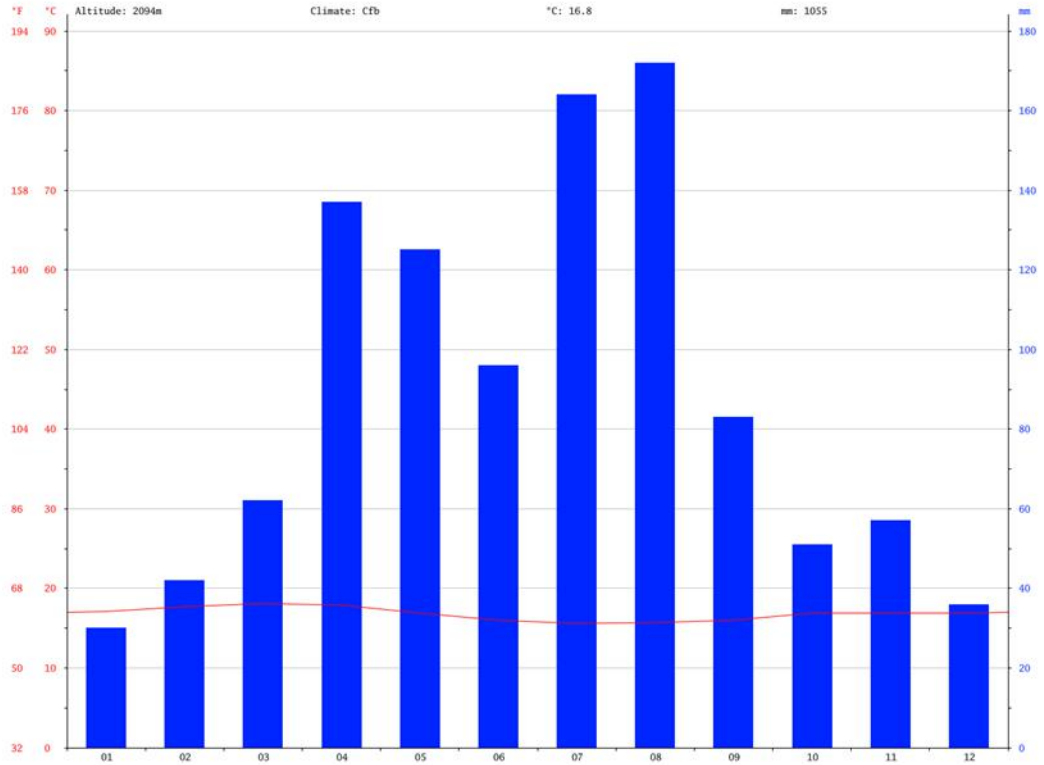
6.5 SOILS

The south east section of Uasin Gishu County consist of well drained dark red, deep red friable clay, dark sandy loam derived from the basement rock complex Towards the north the soils are of low fertility, on the mountain foot soils are dark brown with acid humid top soils. These soils have moderate to high fertility.

The rocks in the district are mainly sediments, grits, sand stones, shale's and limestone's which have formed from metamorphosis of series of shale's and calcareous, The catchment area is made up of the metamorphic outcrops due to large scale block faulting near the edge of the Rift Valley.

6.6 CLIMATE AND METEOROLOGY

The position of the project area Sabor is at relatively high altitudes strongly affects the climatic conditions of the Town. Figure 6-1 shows rainfall and temperature averages between 1990-2009 for Eldoret. On average, total annual precipitations are of approximately 1223 mm, relatively evenly distributed throughout the year, though with higher precipitations during the winter months between April and September.



6.7 LAND USE

The region had undergone dramatic changes in the last century in response to transitions brought about under colonial rule and post-independence administration. In this semi-arid district, the issue of land use and population dynamics is strongly intertwined, whereby two major caesuras are to be mentioned.
The second transformation came with Kenya's independence in 1963. Large ranches and farms were taken over by the government or sold to private companies. They were then subdivided in small plots and redistributed to small scale farmers, willing to migrate into the area. The immigrants mostly came from the very densely populated high potential areas south west of Mt. Kenya, causing a heavy population increase within a relatively short time. Along with the immigration of small scale farmers, the process of growing regional centres continued to develop.
The land use systems in Eldoret East are strongly reflected by these population dynamics. By now, approximately one third of the original large scale ranches have been subdivided.

6.8 BIOLOGICAL ENVIRONMENT

The distribution of vegetation and wildlife in Uasin gishu County as a region is controlled by climate, the geological formation (soil) and human interaction (tree cutting, clearing and grazing).

Plant species are dominated by trees on farms being the main agricultural practice. Other lesser agricultural plants noted includes millet, sorhum, and isolated food crops. Most of the land in the area is covered with grass species, shrubs and in some places ornamental plants and flowers. Tree species seems stunted, perhaps due to the geological formations, soil characteristics and water shortage. Indigenous plant species are fast being replaced by human social and economic activities including commercial and settlements.

6.8.1 Flora

Vegetation in the area is comprised of mature tree species and grass as ground cover. Generally, the project environment has scanty vegetation with the most dominant vegetation around the intake point where the pipeline will cross an 8 km stretch in the Sabor fores which is dominantly Cyprus species. Modern vegetation varies substantially across the area, with a total of twelve identifiable categories of natural, semi-natural and humanly created vegetation types. These range from agricultural and urban vegetation complexes at one extreme, through plantation forest and different categories of leafy bush land and grassland, to upland dry forest and various marshy wetlands.

6.8.2 FAUNA

Human habitation and agricultural activities have also significantly interfered with both terrestrial and aquatic habitats in the Project areas. There is no terrestrial wildlife observed in the Project areas since most land is already developed. However, limited rodents like squirrels, moles and different bird and insect species among others are found in the area (specific habitats characteristics will be established during the detailed assessment). Among the aquatic species present include frogs, fresh water fishes are found naturally in the rivers. Livestock keeping is significant with cattle livestock, goats, sheep, bees, poultry, rabbit and pigs.

6.8.3 Mammals

Large mammals are not encountered in Sabor

6.8.4 Reptiles

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

6.8.5 Insects

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

7.0 SOCIOECONOMIC BASELINE

7.1 INTRODUCTION

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

- The 2009 Census of Population and Housing Census. Most of the data reported for the socioeconomic baseline is from this source.
- Community socioeconomic survey conducted.
  Community consultations conducted in August 2018

7.2 POPULATION AND DEMOGRAPHY

The projected population of Lunga Lunga town is estimated to be 31,056 by the ultimate design year 2040. Based on the population it is anticipated that the water demand for the two towns will be 6,333 m3/day for the year 2040. The water is required for domestic purposes.

7.2.1 Settlement Patterns

Matuga and Msambweni Constituencies are most densely populated with population density of 162 and 376 persons per Km2 respectively. These constituencies lie along the Mombasa – Lunga- Lunga highway and well-developed infrastructure such as water, road network, and electricity.

There are also more industries and tourism hotels along the ocean that serve as sources of employment and markets for farm produce. These constituencies also enjoy favourable climatic condition for farming. Kinango Constituency had the highest population of 230,053 in 2012 up from 209,560 in 2009 and is projected to reach 252,550 and 268,758 in 2015 and 2017 respectively, followed by Lunga Lunga Constituency. Ukunda is the least populated with a total population of 136,450 persons but it's the most densely populated.

The pipeline route is close to residential facilities and may be affected by the construction especially through noise and dust emissions.

7.3 CULTURE AND HERITAGE

The main communities residing in the project include the Kalenjin . The Elgeyo marakwet county side at the intake there are the Marakwet
There are no known physical cultural resources along the project routing that would be adversely impacted by the project. Uasin Gishu County is home to 894,179 people as per the 2009 National Statistics, representing 50% male and 50% female. It is largely a cosmopolitan region, with the Nandi people of indigenous Kalenjin communities having the highest settlement.

Apart from Kalenjin sub tribes, other communities with notable presence in the county especially in urban settlements include Luhya, Kikuyu, Luo, Kamba, Kisii among others. Although traditionally pastoralists, modern Kalenjin communities are mainly large scale wheat and maize farmers earning the county a name for being Kenya's bread basket. Dairy farming is also done in large scale in most parts of the county. Various food and horticultural crops also do well in the highly arable land.

7.4 EDUCATION

Uasin Gishu County boasts of over 770 primary schools, 158 secondary schools and about 15 tertiary institutions.

Some top secondary schools in Uasin Gishu include Moi Girls secondary, Hill school Primary and Secondary School, SOS school, Uasin Gishu (UG) secondary and Kapsoya secondary all located within Eldoret town. Others are Moiben Boys'High School, Turbo Girls' and Kamagut Secondary schools among others.

The county has several middle level colleges and universities. Among the high level institutions include Moi University, Eldoret Aviation College, Rift Valley Technical Training Institute and Eldoret Polytechnic.

7.5 HEALTH

There are many hospitals, dispensaries and health centers in all major towns within Uasin Gishu County. Among the well-known hospitals within Eldoret town include Moi Teaching and Referral Hospital, Uasin Gishu District Hospital, Eldoret Hospital, Eldoret Hospital, Mediheal Hospital and Elgon View Hospital among others. Uasin Gishu Langas hospital in Langas estate is the latest health facility to be built in the town.

7.6 ENERGY SOURCES

The most common source of energy in the County is wood fuel used by 45.0 per cent of households for cooking, and 0.5 per cent for lighting. Paraffin is used by 5.0 per cent and 95.5 per cent for cooking and lighting respectively, whereas 11.5 per cent of household use charcoal for cooking with 10.6 per cent using electricity for lighting. Petroleum is used mainly in transport and households e.g. water pumps and generators. Kerosene is the main source of lighting in rural areas. It is also used for cooking in both urban and rural areas.

7.7 SOLID WASTE

The solid waste management in Uasin Gishu has challenges mainly as a result of inadequate capacity and use of undesignated dumping sites especially along the road sides and storm water drainage channels. The waste is an eye sore and causes environmental problems on air and marine water pollution. Liquid waste and chemicals leached from solid waste dump sites pollutes the marine environment.

Latrine coverage is a key component in household sanitation. The pit- latrine is the main type of toilet facility in the County accounting for 34.7 per cent of the total population followed by uncovered pit latrine at 33.5 per cent. The latrine coverage stands at 41.4 per cent which is generally below the national target of 90 per cent.

7.8 POVERTY, INCOME AND EMPLOYMENT

Unemployment in the county is high particularly among youth. Youth population comprises 38 per cent of the population in the county and 61 per cent of the county's labor force. Efforts need to be stepped up to ensure youth become gainfully employed. Current estimates indicate that 38 per cent of the population in the county is poor. The high unemployment and poverty rates underscore a critical need to address the challenge of unemployment by providing opportunities for gainful engagement to all youth.

7.8.1 Employment

Wage employment is still very low within the county, with most of the employment being in the hospitality sector. As a result, the wage employment in the county contributes 8.6 per cent of household income. The employed include general laborers, those employed in production and manufacturing sector, teachers and public servants.

7.9 GENDER

Gender inequality in the county is manifested in all spheres of life and poses a serious development challenge. The enrolment rate in schools indicates that 49 per cent, 51 per cent and 48 per cent of those enrolled in pre-primary, primary and secondary schools respectively are girls respectively. The dropout rate for girls is lower than for boys but their performance is poorer.

Statistics from the Kenya National Chamber of Commerce and Industry shows that 70per cent of its business members are men, whereas women and the youth account for 30 per cent. Majority of the women depend on petty trade and low-income jobs. Low representation of women in decision making organs (civic and development committees) is also a major gender issue.

Gender disparities are also found in government institutions where more than 80 per cent of all the departmental heads and their deputies are men. The same trend is evident in all major private sector institutions such as tourist hotels.

8.0 PUBLIC CONSULTATION AND DISCLOSURE

Public participation is basically concerned with involving, informing and consulting the public in planning, management and other decision-making activities. Public participation tries to ensure that due consideration is given to public values, concerns and preferences when decisions are made. It encompasses the public actively sharing in the decisions that government and other agencies make in their search for solutions to issues of public interest.

Public consultation in this project was carried out with the following aims:

- To inform the local people, leaders and other stakeholders about the proposed project and its objectives
- To seek views, concerns and opinions of people in the area concerning the project
- To establish if the local people foresee any positive or negative environmental effects from the project and if so, how they wish the perceived impacts to be addressed

8.1 CONSULTATION AND AWARENESS

This ESIA has been prepared in close consultation with local communities, business and special sector groups, government agencies and other stakeholders, who have been informed about the Project and the likely impacts. Consultations were through informal group discussions in the Project communities; FGD; and through formal meetings with ward and other leaders. Meetings and consultations that specifically involved discussions related to the RAP only are not included in this ESIA, but will be presented in the RAP document.

8.2 INITIAL INTERVIEWS

Interview of the stakeholders was undertaken during the ESIA study process. The principle was to assess the initial opinions and attitude of the stakeholders to the project including all the components. Categories of stakeholders contacted include:

- Project Affected Persons, community members and opinion leaders of the project locations, women leaders and women groups in the area of influence
- Members of Local Administration, National Government, County
- Uasin Gishu County Government (County Executive Committee Member for Water and Environment and County Executive Committee Member for Land).

8.3 FORMAL PUBLIC CONSULTATIONS

Public Consultation meetings were held at the centres shown in table 38 and 39 below. The meetings were facilitated NIB with the assistance of the Contractor. The purpose of the consultation was to allow interested and affected parties to give their views of the proposed Project. The consultation meetings saw the participation of representatives of the nearby centres and institutions as well as health facilities. The list of attendees is presented in **Appendix 1**.

The following key issues came out from the consultations:

- **ELGEYO MARAKWET**
  Community at the intake-
- The community at the intake area felt that they have been left out from the project because they will not benefit directly.
- They are opposed to the implementation of the project if they will be totally left out as beneficiaries of the flood flow water supply for irrigation.
- The community strongly felt that in the event that the project is implemented then their youth should be given job opportunity.
- There was concern that the water may not be enough for downstream users if the abstraction is

done during dry season

UASIN GISHU COUNTY – BENEFICIARIES

Lower Sabor community

- As the main beneficiaries the community generally welcome the project
- They are supporting the project and hope priority will be given to the young men and women among them to work in the project
- Community members wanted equity to be enforced because there are some members who do not have the financial muscle to install the require irrigation systems (domestic water pans, pipelines etc)
- There was a feeling among the community that part of the water delivered should be treated and supplied to then at strategic points for domestic use especially in dry season.
- There was also a call for capacity building of the community to operate and maintain the irrigation system

General observations

- **Environmental**: the community felt that there will be no major direct impact of the water pipeline construction.
- Indirect impact at the operational stage was identified as agrochemical negative effects
- The community also believed if the water is used for tree nursery production would help make tree seedlings available for community forestry programs
- **Resettlement**: Problem of people building over water lines, displacement is not a new phenomenon and community members consulted did show a willingness to accept resettlement for compensation where such would happen.
- **Employment**: Opportunities for gender equality, including both men and women and incentive for employment such as payment rather than volunteering.
- **Sub-project specific issues**: Technical and community participation issues.
- Occupational Health and safety issues
- Community health and safety issues
- Gender Based Violence and SEA issues

OTHER STAKEHOLDERS CONSULTED

1. Water Resources Authority - WRA
2. Kenya Forest Service - KFS
3. ITWASCO- Iten Tambach Water and Sewerage Company
4. Local Administration – Elgeyo Marakwet County
5. Local Administration – Uasin Gishu County
6. NEMA- Elgeyo Marakwet
7. NEMA – Uasin Gishu

9.0 RESETTLEMENT LAND ACQUISITION AND COMPENSATION

9.1 INTRODUCTION

The design has focused on minimizing the need for resettlement and land acquisition. This is possible because where rehabilitation or replacement works are required they are done either within ROW or other publicly owned property or within existing way leaves. Where new buried pipelines are required, they are located within the road reserve. However, some land acquisition is required for forest access. There will also be short term resettlement impacts during construction, for example upon encroachers farms within the road reserve or businesses or livelihoods impaired by the works and construction activities along the roads.

9.2 RESETTLEMENT CORRIDOR OF IMPACT

The design has considered constructability and the space required to lay pipes in trench. Assuming narrow trench pipelines excavated by backhoe, it is conventional for water works to work within a carriageway width typically 3.5 m. Therefore, the specified working space for construction will be 3.5 m which is also the RCoI assumed for the RAP.

There are however exceptions at constricted locations where the works contractors will be required to work in a narrower RCoI to minimize resettlement impacts. In such locations the works contractor might use smaller excavator (mini excavator) or hand excavation using hand held equipment. Locations with a reduced RCoI will be identified in the Bidding Documents scheduled and shown on the plans with GPS coordinates.

9.2.1 Works Contractors Methodologies

For the purposes of this project, the RCoI shall be defined as; 'the width of the corridor needed to construct and maintain the specific water supply and sanitation infrastructure'. The RCoI in the majority of the project areas will be 3.5 m, but will be less in certain project areas and will be defined as 'Working Constrained Areas'. The RCoI will be cleared of obstructions to the extent feasible in advance of the date of the contractual Notice to Proceed (NTP). However, regardless of available RCoI width, the Contractor shall adopt a method for working in all project areas which will avoid unnecessary physical impacts on all assets including residences, businesses and utility structures. Works shall be conducted in a manner such that any vegetative hedges remaining at the date of the NTP may be cut back, but shall remain viable. Structures not identified as 'impacted' under the RAP, and remaining at the date of the NTP, may not be damaged during construction. Access to any business (formal or informal) in project areas shall not be obstructed for more than three days in any case, unless identified and compensated under the RAP prior to construction implementation.

9.2.2 Working in constrained areas

Working constrained area

For the purposes of this project 'Working Constrained Areas' shall be defined as those project areas in which the available RCoI is greater than 1.5 m but less than 3.5 m. This is to enable the reduction of resettlement impacts and to enable the works contractors to ensure that their offers incorporate provisions for smaller machines and labour requirements in such spaces. For the purposes of this project 'Severely Working Constrained Areas' shall be defined as those project areas in which the available maximum RCoI is 1.5 m (or 2.5 m where water supply and sewage pipes are laid alongside each other). This is to enable the reduction of resettlement impacts and to enable the works contractors to ensure that their offers incorporate provisions for smaller machines and labour requirements in such spaces. The Working Constrained and Severely Working Constrained Areas will be identified by the RAP team and incorporated into the bidding documents.

9.2.3 Flexible RCoI

The RCoI will be flexible such that it may vary back and forth in order to allow for maintaining continued access and the avoidance of impact on businesses and residences and related assets, public utilities equipment and vegetation, whilst preserving the requirements of the design.

9.2.4 Access to Businesses and Residences

Works contractors will be required to maintain pedestrian access to residences and businesses along RCoI during works, unless identified and compensated for losses recorded by the RAP. Residences and businesses foreseen to be affected during construction, due to 'constrained' construction conditions, will have been identified and compensated prior to the start of construction.

9.2.5 Drainage Function

Where the design or works contractor methods of working disturb or interfere with existing surface and groundwater drainage, the works contractor will be required to ensure correct drainage function during the course of the works and thereafter restore such drainage to CGK requirements and to at least pre-construction condition or better standard. This may require reinstatement of drains disturbed by construction. This requirement applies to all formal and informal drains alongside sealed and unsealed roads.

10.0 ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION

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

10.1 CLASSIFICATION OF IMPACTS

The significance of impacts has been determined by combining the perceived frequency of occurrence of the source of the impact, the duration, severity, and spatial extent of the impact and the sensitivity of the area being impacted upon. The analysis was aided by using the classification of impacts shown in **Table10-1.**

Table 10-1. Classification of Impacts

		Classification of Effects	
Impact criterion	**Effect on environment**	**Expression**	**Effect description**
Positive or negative	Will impact be positive or negative?	Positive	A positive impact
		Negative	A negative impact
Likelihood of occurring	What certainty of occurrence is associated with impact?	Unlikely	Probably will not occur
		Possible	May not occur
		Certain	Will not occur
Duration	What timeframe or period is effect to be felt or last?	Short Term	Will last up to end construction activity
		Medium Term	Will last as long as operational activity
		Long Term	Will last beyond project operation
		Permanent	Will last a lifetime
Timing	At what stage will the impact occur or be felt?	Immediately	Will occur upon starting project activities
		Near Future	Will occur during project operation
		Distant Future	Will occur beyond project operation
Significance	How severe will the impact be?	Minor	Little impact
		Moderate	Moderate impact
		Significant	High Impact
Extent	What is the areal extent or coverage of impact?	Project area	Effect confined to project area
		Environs	Effect to be felt by surrounding areas

		Beyond environs	Effect to be felt within surroundings and beyond environs
Overall rating	How important is impact in Project design?	Insignificant	Impact not substantial, needs no mitigation/enhancement
		Minor	Impact of little importance, needs limited mitigation/enhancement
		Moderate	Impact has influence and requires mitigating/enhancing
		Significant	Impact of great importance, mitigation/enhancement a must

10.2 POSITIVE/BENEFICIAL IMPACTS

- Proper infrastructure in preparation for improved irrigationwater supply to Sabor community
- Better access to water leading to improved standard of living; and changes in exposure to both communicable and non-communicable diseases;
- Improved agricultural productivity;
- The program will contribute to increase in local development and employment as the local population are likely to be employed during the construction phase and after construction due to water related investments;
- Further increase in agro-tourism in the area.
- Increase in land value within the project area, due to availability of water.
- Provision of a sustainable water resource will generate business and employment opportunities, and provide a stimulus for women to become more active in employment generation activities.

10.3 ADVERSE IMPACTS

Even though the project has many positive impacts that will lead to social economic development in project area, it also will come with negative impacts that need to be mitigated during the construction, operation and decommissioning phases. The categorization of impacts has been based on the severity of the potential impact using predefined impact rating criteria as minor, moderate or major according to the definitions below.

(a) Minor impact – an effect will be experienced, but the impact magnitude is sufficiently small and well within accepted standards, and/or the receptor is of low sensitivity/value.

(b) Moderate impact – an impact that will be within accepted limits and standards. They may vary from a threshold below which the impact is minor up to a level that might be just short of breaching an established regulatory limit.

(c) Major impact – is where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. Extent: within limited area (<200m from site), local (up to 10 km) or wide (regional or global > 10km); Duration: temporary (1 year), short term (1-5 years), medium term (5 - 10 years) long term (> 10– 50 years) or permanent.

The environmental impacts resulting from implementation of civil works are expected to be minor and short-term since the improvement works are principally for the laying of buried pipelines and works at existing above ground structures.

10.3.1 Impact on Utilities

The utilities (ground) along the project area that may be damaged as a result of the excavation for the pipelines include fibre optic cables, existing water pipelines and in exception cases electricity lines. Damage to these utilities due to excavation may cause interruptions to services associated with the same.

Significance of Impact

This impact is not expected to be significant because there is limited fibre optic cable on the project routes; electricity lines are overhead and the routing of the pipeline is away from the existing water lines. However, as a general rule, before excavation, the location and routes of all utilities have been identified and in case of the need for relocating utilities that may be along the proposed lines, the contractor MUST work with the utility company before commencement of any excavations to relocate such utilities at contractors cost before commencing excavations.

10.3.2 Impacts on Flora and Fauna

Recognizing that the proposed water supply system route mainly passes through rural farms and inhabited areas, along roads, where tertiary types of ecosystems are already dominant, it is unlikely to expect significant negative impacts on flora and fauna from this project.

A temporary loss of habitat along the working corridor could reduce the carrying capacity of the home ranges of the fauna, especially until vegetation cover is re-established. However, the majority of species present in the project area, are common and widely distributed throughout the area and the loss of a few individuals will have a negligible impact on the overall population both at local and regional level.

Significance of Impact

In this project, low impact is expected on vegetation and any fauna in the area since the pipeline routes are devoid of significant unique floral and faunal life. Sections of the pipeline (distribution pipeline) are within residential and built areas which are deficient of natural flora and fauna.

The clearing of project sites through excavations for the pipelines will not adversely affect flora and fauna and all the impacts caused by construction work on flora and fauna are of temporary and reversible in nature and can be mitigated by appropriate good working practices that will be prescribed by the ESMP.

10.3.3 Impact on Air Quality

The impact on air quality is expected within the area of the working corridor. The impact on air quality is expected as a result of construction works, specifically excavation of the trenches which will generate dust with motorized equipment also generating gases. The processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works.

It is not expected that significant impact will occur on local residents or that emissions will exceed regulatory permissible ground-level concentrations. All air emission impacts will be of temporary nature, location specific and reversible. The impact on air quality is considered to be insignificant if appropriate mitigation measures are implemented such as dust suppression techniques, regular maintenance of vehicles, use of high-quality fuel, etc. Further, the project will be implemented through the significant use of manual labour and mostly through manual equipment for digging the trenches. This minimizes the air quality impacts from motorized machinery. Trenches will be about 1metre in depth and therefore the amount of spoil material will be minimal with the backfilling using the same spoil material undertaken within 3-5 days of excavating. Sources of air pollutants from the construction works will include traffic in and out of the site emitting and earth works at site during the excavation of trenches.

Significance of Impact

The impact on air quality is regarded as low even without mitigation and limited within the footprint due to the minimal use of motorized equipment with respect to gaseous emissions and particulate matter with respect to dust emissions. The project will be implemented through the use of manual labour and mostly through manual equipment for digging the trenches. The difficulties in isolating air pollution originating from construction works and air pollution from the surrounding sources are expected, which will have impact on monitoring programme.

10.3.4 Impact on Soil and Geology

The excavations of trenches to lay the transmission and distribution pipeline and reservoir are not anticipated to significantly impact on soil and geology of the project site other than disturbances to soil which could subsequently resulting in erosion and soil contamination by oil leaks from excavation and construction equipment.

The works on construction including removal of topsoil and digging, as well as presence of machinery and workers at site will have minor negative impact on soil quality. The identified impacts are the following:

- Mechanical impact on soil during trench excavation;
- Stimulation of water and wind erosion;
- Soil pollution by spilling or discharge of oil and oil derivates, motor oil, and similar wastes originating from machinery and vehicles on site;
- Soil pollution due to uncontrolled deposition of solid waste (spoil material) on the land;
- Soil pollution due to uncontrolled discharge from on-site toilets for workers on the land;

In the areas where steep slopes are to be crossed, construction can have potential to cause soil erosion and sediment run-off. Soils in the area are sandy and not clay which are known to be particularly prone to erosion. Reinstating the land is standard practice and will be carried out above a pipeline once it is buried in the ground. The objectives of restoration are twofold:

- In the shorter term, to reinstate the land contours, drainage patterns, stabilize the soils by installing permanent erosion control and redistribute the topsoil to allow vegetation to grow; and
- In the longer term, to establish sufficient vegetation cover to reinstate the local plant species and ecology.

The delay in reinstatement can cause deterioration in topsoil quality, dissatisfaction by land owners and can increase the cost of later reinstatement. Where required, the seed of species remaining in the preserved topsoil will be supplemented with equivalent materials (seeds, bulbs, and plants) and/or by the re-planting of species removed from project area before construction.

During construction, the correct preservation of topsoil to maintain fertility will be carried out. The topsoil will be carefully stripped and stockpiled at all sites. Reinstating activities will take place immediately after pipe is buried in order to preserve quality of topsoil removed. With implementation of these measures, the residual impacts are not considered significant.

Significance of Impact

The impact on soil and geology is regarded as low even without mitigation and limited within the project footprint. The depth of the trenches will be shallow (1-metre-deep and 2 metres wide) and the excavated soil (spoil) will be used as backfill thereby reducing potential run off associated with spoil wastes. The use of motorized equipment likely to lead to soil contamination from oil leaks is also expected to be minimal as a result of little or no use of motorized equipment during construction.

10.3.5 Noise and Vibration Impacts

During the construction phase of the project it is expected that elevated levels of noise will be produced in the construction area. Pipeline construction would progress along the route and, as a result, all noise impacts would be temporary.

During excavation activities (trenching), noise sources will include, vehicles used to transportation of materials and equipment to the site. The construction and more specifically excavation of the trenches for the pipelines will be through the use of hand-held equipment (manual labor) with very limited use of mechanized machinery which would be sources of noise and vibration. This impact is therefore expected to be low in nature and short term experienced only in cases where motorized equipment is used. The works will mainly be carried out during the daylight working hours with no night working expected. Mitigation measures will prescribe daylight working hours in the most affected zones.

Impact Significance

The significance of this impact will be low with mitigation measures in place as described in the mitigation measures section. In undertaking the construction activities described above, the Contractor will comply with the following national regulatory noise quality emission standards and that of WBG, whichever is stringent. Regular monitoring to determine compliance will be done by the Supervision Consultant and corrective/ mitigation measures applied where necessary.

10.3.6 Solid Waste Generation

- Solid wastes will mainly emanate from the construction activities and will include among others:
- Excavated soil
- Cement storage bags and other packets from materials used during construction.
- Spillage of oil and grease from machines used in excavation, repair and maintenance and transportation activities may also encompass solid wastes.

The occurrence of these wastes is expected to be minimal because of the expected use of manual equipment and labor which would reduce wastes associated with oil spills, repair and maintenance.

The soil excavated will be used as backfill and thereby reducing the generation of spoil material and related waste pollution concern. There will be limited hazardous wastes generated from this project including the cement bags, grease and oil. All wastes including will be disposed in an approved NEMA waste disposal site. The contractor will develop a **Waste Management Plan** (WMP) to guide the disposal of all types of wastes emanating from the project

Impact Significance

The impact significance is expected to be low in nature as a result of the low quantities of solid wastes that will be generated during construction and use of excavated soil and backfill material.

10.3.7 Visual Impacts

Visual related impacts mainly include open trenches excavated to lay the pipelines which could be an eye-sore and a health hazard. The pipelines will be 2 metres wide and 1 metre deep. The trenches are therefore not deep and wide depressions which would scar the earth surface and lead to significant visual impacts. This impact is therefore not considered to be significant and will be experienced for a short period of time because of the immediate backfilling of the trenches by the excavated soil/spoil. The laying of a pipeline is expected to last for a period of 3-5 days at the most in an area including excavation

and laying of pipelines. Further, the contractor is required to only excavate areas where there are already existing pipelines procured and ready to be laid. This will minimise the problem of open trenches.

Impact Significance
The impact significance is expected to be low in nature, short term and reversible if the trenches are backfilled immediately and excess spoil material is disposed of as soon as possible.

10.3.8 Impacts on Surface Water
The excavation activities (trenching) and associated run-off, oil leaks and proximity to surface water bodies may lead to contamination of surface water bodies. In the project area and pipeline routes, there are no surface water bodies. The national and international waste water and effluent discharge standards are shown in chapter 3 of this report.

10.3.9 Impacts to Occupational Health and Safety
Construction staff will be exposed to safety hazards arising from construction activities. The main pipeline is to be placed along major roads together with a distribution system along rural access roads and footpaths these roads have pedestrian and vehicular traffic and this may cause an increase in the number of accidents. The project works will expose workers to occupational risks due to handling of heavy machinery, construction noise, electromechanical works etc. At the concrete mixing plant the exposure of human skin to cement may lead to damage of the skin.

Construction activities of bush clearing, materials delivery, trench excavation and concrete mixing and construction traffic will generate a lot of dust and this may affect the respiratory system. The high temperatures in the area will expose the workers to difficult working conditions. Construction sites may be a source of both liquid and solid wastes. If these wastes are not well disposed these sites may become a breeding ground for disease causing pests such as mosquitoes and rodents.

Sexual harassment between project workers is another occupational health and safety risk that could occur during project implementation. Sexual harassment can occur between workers, particularly male workers against female workers, when there is insufficient sensitization of workers against prohibitions for sexual harassment, as well as the absence of reporting and disciplinary measures.

Construction activities including excavations, backfilling involve inherent occupation health risks related to operation of equipment and machineries. In the absence of sufficient management of Health and Safety (H&S) issues, the workforce may suffer injury or death. In this project, the use of manual labour is envisaged and will account for over 90% of the construction activities. This is because the project area is peri-urban and congested with little room to employ mechanized equipment.

Impact Significance
Occupational health and safety impacts during construction is considered to be of moderate in significance due to the expected use of non-mechanized equipment and machinery. The construction activities will use hand held tools in digging the trenches with very limited use of excavators. Experienced and trained personnel will be engaged in operating equipment.

10.3.10 Impacts on Community Health and Safety
No specific serious adverse impacts on community health and safety are expected as a result of construction and operation of the Sabor Water Supply System. There is potential hazard risk from open trenches in the vicinity of populated areas during the construction phase that should be mitigated by appropriate warnings and fencing. Health impacts associated with air and dust emissions on the community is also expected to be very insignificant, short term and localized. The contractor will prepare

an **Occupational Health and Safety Plan** for minimizing occupational and community health and safety impacts.

Impact Significance
The health and safety impacts during construction is considered to be of moderate in significance due to the expected use of non-mechanized equipment and machinery.

10.3.11 Sexual exploitation and abuse of community members by project workers
This impact refers to sexual exploitation and abuse committed by Project staff against communities, and represents a risk at all stages of the Project, especially when employees and community members are not clear about prohibitions against SEA in the Project.

10.3.12 Impacts on Traffic
There construction activities will occur in certain sections in densely populated areas and along the existing Right of Way (ROW) where there is motorised and non-motorised traffic especially in the residential areas. Snarl ups due to blockage of the road could lead to traffic as well as potential risk for accidents especially where construction is on-going with little room for pedestrian access. The construction method will mainly be through manual equipment which will reduce the potential for traffic blockages that would be caused when using motorised equipment like excavators. The contractor will prepare a detailed traffic management plan (TMP) which will elaborate how traffic will be managed during construction, including need for diversions (if necessary). The TMP will be developed jointly with the roads agencies in Uasin Gishu i.e. Kenya National Highways Authority (KeNHA) and Kenya Urban Roads Authority (KuRRA) as well as the County Government of Uasin Gishu(Traffic Department).

The contractor will barricade all areas of work along the road to reduce accidents and offer alternative pedestrian walk ways as necessary.

10.3.13 Public Health and Safety
There is a potential induced impact during construction causing increased incidence of HIV/AIDS and communicable diseases due to new entrants in communities for employment. There is a potential induced impact when increased income in the communities, from construction worker salaries, leads to domestic abuse in the home. Both these impacts can be mitigated by the HIV/AIDS and sensitivities awareness programs set out in the ESMP.

Construction staff and the general public will be exposed to safety hazards arising from construction activities. It is proposed that the pipelines be located within existing road reserves, however there will be a possibility of interrupting access to road side businesses, facilities and houses. The project works will expose workers to occupational risks due to handling of machinery, construction noise and manual handling, etc. Construction activities of vegetation clearing, excavation, materials delivery may generate dust that will pollute the air and this may affect the respiratory system. Construction sites may be a source of both liquid and solid wastes. If these wastes are not well disposed these sites may become a breeding ground for disease causing pests such as mosquitoes and rodents.

10.3.14 Spread of communicable diseases and HIV/AIDS infection
In migration of people from different regions may lead to behavioral influences which may increase the spread of diseases such as Human Immuno-Deficiency Virus (HIV), Acquired Immune Deficiency Syndrome (AIDS) and other Sexually Transmitted Infections (STIs).

10.3.15 Resettlement Impacts
The project may displace Project Affected Persons (PACs) who are on the proposed pipeline routes. Though this is not envisaged, in the unlikely event A Resettlement Action Plan (RAP) will been prepared

to mitigate project related displacement impacts.

10.3.16 Gender Based Violence

GBV constitutes acts of gross misconduct and are therefore grounds for sanctions, penalties and/or termination of employment. This impact refers to gender-based violence at the community level that women and girls may experience as a result of Project implementation. This includes, for example, an increase in intimate partner violence (IPV) when compensation schemes that share funds equally among husband and wife at the household level do not provide adequate sensitization and safety measures to reduce potential for increased tensions due to females receiving funds. This also refers to other GBV-related risks incurred as a result of project implementation that do not adequately consult women and adolescent girls in the community about safety and security issues related to the delivery of water and sanitation services.

10.3.17 Child Protection

Violence against Children (VAW) is defined as as physical, sexual, emotional and/or psychological harm, neglect or negligent treatment of minor children (i.e. under the age of 18), including exposure to such harm,4 that results in actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility, trust or power. This includes using children for profit, labor5, sexual gratification, or some other personal or financial advantage. This also includes other activities such as using computers, mobile phones, video and digital cameras or any other medium to exploit or harass children or to access child pornography.

The Children Act of Kenya prohibits contractors from "employing children in a manner that is economically exploitative, hazardous, and detrimental to the child's education, harmful to the child's health or physical, mental, spiritual, moral, or social development. The possibility of contractor children abuse is through hiring of child labour, also labour force on site might abuse children within the Project area through sexual advance that could lead to early pregnancies and school dropout including exposure to communicable diseases such as HIV and AIDS. It is also important to be vigilant towards potential sexual exploitation of children, especially young girls. The contractor should adopt a 'Child Protection Code of Conduct'; that all staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behaviour. The contractor will undertake the below listed mitigation measures.

10.3.18 Labour Influx and Recruitment

The project will involve recruitment of laborers which may lead to influx of persons looking for work in the project area.

Several features of the Project could prompt in-migration.

- Local labour requirements: Construction of the project will employ a significant number of people. There is a perception in the project area, evident from the results of stakeholder engagement during the ESIA and RAP study, that a high level of opportunity will result from this and this is likely to stimulate significant in-migration. In practice, the level of construction employment available to local workers will be focused on skilled, unskilled and lower skilled workers.
- Project demand for goods and services: The scale of the Project may generate high expectations around opportunities associated with the supply chain. Demand for goods and services in the local study area may be high during construction, and very low during operation, this is still likely to be a strong pull factor.

[4] Exposure to GBV is also considered VAC.

[5] The employment of children must comply with all relevant local legislation, including labor laws in relation to child labor and World Bank's safeguard policies on child labor and minimum age. They must also be able to meet the project's Occupational Health and Safety competency standards.

- Operation of construction sites: Construction works are also likely to act as a magnet for people and are likely to attract some in-migrants.

The significance of labour influx is expected to be low or moderate and mostly unskilled in nature. The Contractor will comply with the national labour laws as well as the develop a **Labour Recruitment Plan and Influx Management Plan** and submitted by the Contractor to the NIB, Supervision Consultant before commencement of construction.

10.3.19 Gender Empowerment

There is need to promote gender equality in all aspects of economic development and more so in construction. The Contractor should uphold principles of gender equality through compliance with the following:

(i) Gender Inclusivity requirements in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 gender rule.

10.4 Operation Impacts

10.4.1 Consumption of Contaminated Water

Consumption of (untreated) contaminated domestic water could lead to health impacts on the consumers of the water from the pipeline. The maintenance of the pipelines requires excavations and unblocking the pipe which could lead to contamination of the water during the process.

Impact Significance

The impact is considered low in significance due to the expected treatment of water by community.

10.4.2 Solid Waste Generation

Solid wastes will mainly emanate from the operation activities related to maintenance operations and will include among others:

- Excavated soil
- Cement storage bags and other packets from materials used during repair and maintenance.
- Spillage of oil and grease from machines used in excavation, repair and maintenance and transportation activities may also encompass solid wastes.

The occurrence of these wastes is expected to be minimal because of the expected use of manual equipment and labor which would reduce wastes associated with oil spills, repair and maintenance. The soil excavated during maintenance will be used as backfill and thereby reducing the generation of spoil material and related waste pollution concern. There will be limited hazardous wastes generated from this project including the cement bags, grease and oil. All wastes including will be disposed in an approved NEMA waste disposal site.

Impact Significance

The impact significance is expected to be low in nature as a result of the low quantities of solid wastes that will be generated during operation.

10.4.3 Visual Impacts

Visual related impacts mainly include re-opening the trenches where the pipelines are laid to facilitate repair and maintenance which could be an eye-sore and a health hazard. This impact is not considered to be significant and will be experienced for a short period of time because of the immediate backfilling of the trenches by the excavated soil/spoil.

Impact Significance
The impact significance is expected to be low in nature, short term and reversible if the trenches are backfilled immediately and excess spoil material is disposed of as soon as possible.

10.4.4 Impacts to Occupational Health and Safety
Operation and maintenance of the pipeline will involve workers whose safety may be at risk as a result of operation of equipment among others. Occupational health and safety impacts during operation/maintenance and repair is considered to be of moderate in significance due to the expected use of non-mechanized equipment and machinery. The construction activities will use hand held tools in digging the trenches with very limited use of excavators. Experienced and trained personnel will be engaged in operating equipment.

10.4.5 Impacts on Community Health and Safety
No specific serious adverse impacts on community health and safety are expected as a result of operation activities of the Water Supply System. There is potential hazard risk from open trenches during the repair phases that could lead to community health and safety risks should be mitigated by appropriate warnings and fencing. Health impacts associated with air and dust emissions on the community is also expected to be very insignificant, short term and localized during the operation phase with respect to repairs and maintenance.

Impact Significance
The health and safety impacts during repairs and maintenance is considered to be of moderate in significance due to the expected use of non-mechanized equipment and machinery.

10.4.6 Impacts on Traffic
There maintenance and repair activities during the operation phase will occur in densely populated areas and along the existing Right of Way (ROW) where there is motorised and non-motorised traffic. Snarl ups due to blockage of the road could lead to traffic as well as potential risk for accidents especially where construction is on-going with little room for pedestrian access. The method used for repairs will mainly be through manual equipment which will reduce the potential for traffic blockages that would be caused when using motorised equipment like excavators.

10.4.7 Impact on Air Quality
The impact on air quality during repairs and maintenance (operation phase) is expected to occur within the pipeline route only. The impact on air quality is expected as a result of repair works, which may specifically entail excavation (opening) of the trenches and may generate dust with motorized equipment also generating gases. The processes which will generate pollutants emission are: transport of material, movement of machinery and vehicles on site and excavation works. It is not expected that significant impact will occur on local residents or that emissions will exceed regulatory permissible ground-level concentrations. All air emission impacts will be of temporary nature, location specific and reversible. The impact on air quality is considered to be insignificant if appropriate mitigation measures are implemented such as dust suppression techniques, regular maintenance of vehicles, use of high-quality fuel, etc.

Further, the project will be implemented through the significant use of manual labour and mostly through manual equipment for digging the trenches. This minimizes the air quality impacts from motorized machinery.

10.4.8 Noise and Vibration Emission Impacts

Noise emission and associated impacts during repairs and maintenance is expected to be low and will emanate from motorized equipment. This impact is expected to be low in nature and short term, experienced only in cases where motorized equipment is used. The repair and maintenance works will mainly be carried out during the daylight working hours with no night working expected unless it is an emergency e.g. pipe burst or blockage. Mitigation measures will prescribe daylight working hours in the most affected zones.

10.5 Impacts During Decommissioning

De-commissioning of the Project is envisaged after a period of 40-50 years however this will only be in the event that the entire pipeline requires overhaul and replacement. Otherwise, pipelines will be frequently replaced during the routine operation and maintenance and thereby unlikely to be decommissioned. However, if they were to be decommissioned, before decommissioning, the contractor will prepare a decommissioning plan for the elements that will require decommissioning. Some of these pipelines if uncovered can have negative impacts on the health of those that come in contact with these materials. Mitigation measures are outlined in table 11-2 below.

Table 10-2. Summary of Impacts

Water Supply Pipelines (Transmission and Distribution)				**Phase: Construction**
Issue	**Potential Impact**	**Impact Type and Rating**	**Extent**	**Duration**
Air pollution	Emissions from construction vehicles and equipment.	Direct, Minor	Local	Temporary
Noise pollution	Noise pollution from vehicles and construction equipment may cause nuisances to neighbouring communities.	Direct, Minor	Local	Temporary
Water pollution	Water pollution may result from: i) accidental spillage of fuels, lubricants and other chemicals. ii) siltation of water courses from runoff laden with sediment and dust. iii) high suspended solids from soil eroded from trenches (sediment run-off)	Direct, Minor	Local	Temporary
Soil erosion and contamination	Site clearance of vegetation and excavation works using equipment may induce/accelerate soil erosion and siltation of water courses. Contamination may occur as a result of accidental or structural spillage of fuels, lubricant chemicals, sanitary wastewater, etc., as well as from leakage from inadequately protected solid waste storage facilities and sites. Soil may lose its fertility because of removal of topsoil.	Direct, Minor	Local	Temporary
Solid waste	Vegetation and soil from excavation, construction	Direct,	Local	Temporary

generation	waste material and packaging material may produce moderate quantities of waste.	Minor		
Impacts on flora and fauna	Removal of vegetation may lead to potential habitat loss of its associated fauna.	Direct, Minor	Local	Temporary
Public health problems	Pools of stagnant water may be a source of water borne diseases especially if the trenches are left open (not back filled) over a long period of time.	Direct, Minor	Local	Temporary
Public Safety	Safety problems at the construction sites may arise from excavations, transportation and movement of equipment. Manually executed works expected to dominate the pipeline laying will take a longer construction time leading to prolonged safety risks such as falling into trenches. • Contractor to risk asses the project activities, develop and implement relevant C-ESMP which will include but not limited to: o An Occupational Health and Safety Management Plan o Waste Management Plan o Labour influx strategy o Contractors Code of Conduct, including provisions on VAC, SEA, and SH o Gender inclusivity strategy o Child protection strategy o GBV Action Plan, including: ▪ SEA Prevention and Response Strategy ▪ SH Policy ▪ GBV (at the community level) Mitigation Plan ▪ SEA Redress Mechanism ▪ SH Redress Mechanism o Employment plans o Occupational Health and Safety Plan o Traffic Management Plan o Decommissioning Plan o Hazard Material Management Plan o Emergency Response Plan; o Spoil management plan; o Grievance redress Mechanism; o Stakeholders engagement and	Direct, Minor	Local	Temporary

	communication plan; • Ensure through routing training and induction to all workers and the community on the project risk and the controls developed to manage them; • Ensure that all construction machines and equipment are in good working conditions and to manufacturer's specifications to prevent occupational hazards. • Cordon off trenches and working areas with a reflective tape to ensure safety of pedestrians and provide crossing areas for access to cut off businesses and structures. • Appointing experienced and trained occupational health and safety staff, first aiders and fire marshal on-site for the duration of the construction work. (both supervising engineer and contractor) • Provide workers with adequate drinking water and breaks. • Provide workers training on safety procedures and emergency response such as fire, oil and chemical spills, pipe bursts, and other serious water loss risks. • Roads passing through population centers will be water sprayed to reduce dust. • Work to minimize or altogether eliminate mosquito breeding sites. • Provide a waste management plan • Fence off the site with security to avoid unauthorized access to the project site (s) and hence potential injuries.			
Visual amenities	Laying of pipelines may have a negative impact on aesthetics of the surroundings such as the soils from the trenches that will be dumped along the trenches	Direct, Minor	Local	Temporary
Disturbance and interruption of commercial and social activities	Improper laying of pipelines may cause traffic disruptions and congestion, resulting in temporary disturbance and interruption of commercial and social activities. It may also cause damage to infrastructure (roads, utility lines) and disruption of public services.	Direct, Minor	Local	Temporary

Socioeconomic disruption	Trenches for the pipelines may be dug in front of shops, displacing kiosks along road reserves and other properties which will affect their livelihood and incomes. Furthermore, influx of people in the area may cause alteration of culture and introduce behavioural changes.	Direct, Minor	Local	Temporary
Occupational health and safety	Workers may be exposed to occupational health and safety hazards from project activities such as: accidents in excavations during trenching; working with equipment; working under noisy conditions., working in confined spaces; lifting of objects; storage, handling and use of dangerous substances and wastes. Workers may also be potentially exposed to HIV and other sexually transmitted diseases.	Direct, Minor	Local	Temporary
Gender Based Violence on community	GBV constitutes acts of gross misconduct and are therefore grounds for sanctions, penalties and/or termination of employment. This impact refers to gender-based violence at the community level that women and girls may experience as a result of Project implementation. This includes, for example, an increase in intimate partner violence (IPV) when compensation schemes that share funds equally among husband and wife at the household level do not provide adequate sensitization and safety measures to reduce potential for increased tensions due to females receiving funds. This also refers to other GBV-related risks incurred as a result of project implementation that do not adequately consult women and adolescent girls in the community about safety and security issues related to the delivery of water and sanitation services.	Direct, Minor	Local	Temporary
Labour Influx	The Project is expected to stimulate minimal in-migration.	Direct, Minor	Local	Temporary
Violence against Children	Violence against Children (VAW) is defined as physical, sexual, emotional and/or psychological harm, neglect or negligent treatment of minor children (i.e. under the age of 18), including exposure to such harm,[6] that results in actual or potential harm to the child's health, survival, development or dignity in the context of a	Direct, Minor	Local	Temporary

[6] Exposure to GBV is also considered VAC.

	relationship of responsibility, trust or power. This includes using children for profit, labor[7], sexual gratification, or some other personal or financial advantage. This also includes other activities such as using computers, mobile phones, video and digital cameras or any other medium to exploit or harass children or to access child pornography.			
Sexual Exploitation and Abuse on community members	This impact refers to sexual exploitation and abuse committed by Project staff against communities, and represents a risk at all stages of the Project, especially when employees and community members are not clear about prohibitions against SEA in the Project.	Direct, Minor	Local	Temporary
Spread of communicable diseases and HIV/AIDS infections	In migration of people from different regions may lead to behavioral influences which may increase the spread of diseases such as Human Immuno-Deficiency Virus (HIV), Acquired Immune Deficiency Syndrome (AIDS) and other Sexually Transmitted Infections (STIs).	Direct, Minor	Local	Temporary
Operation				
Water pollution	Water pollution may result from spillage of fuel and lubricants during maintenance; waste disposal along damaged lines may also cause pollution.	Direct, Minor	Local	Temporary
Noise pollution	Noise generated from vehicles used during maintenance or from generators in case they are used to pump the water can be a nuisance to sensitive receptors.	Direct, Minor	Local	Temporary
Air pollution	This could be in form of emissions from maintenance vehicles	Direct, Minor	Local	Temporary
Solid waste generation	Solid wastes may be produced by maintenance works, especially where sections of pipelines are replaced.	Direct, Minor	Local	Temporary
Soil erosion and contamination	Inspection and maintenance works for the pipelines may require clearance of sites of vegetation, as well as the execution of excavation works, possibly using equipment. This may induce or accelerate erosion.	Direct, Minor	Local	Temporary
Impacts on flora and fauna	Inspection and maintenance works may require the removal of the natural vegetation, leading to potential habitat loss of its associated fauna.	Direct, Minor	Local	Temporary
Nuisances and public health risks as a result of operational	Accidental ruptures and structural degradation of pipelines that may accrue from ageing and poor maintenance, accompanied by low pressure in the pipes may allow the intrusion of potentially polluted groundwater into the drinking water	Direct, Minor	Local	Long term

[7] The employment of children must comply with all relevant local legislation, including labor laws in relation to child labor and World Bank's safeguard policies on child labor and minimum age. They must also be able to meet the project's Occupational Health and Safety competency standards.

failures of the distribution network	distribution system. Ruptured pipes may also cause flood flowing and if the water stagnates, this may pose a risk of water-borne diseases.			
Occupational health and safety	Occupational health and safety problems may arise during maintenance of the pipelines. These may include: lifting of heavy and sharp objects and transportation of materials for maintenance, storage as well as handling and use of dangerous substances.	Direct, Minor	Local	Temporary
Local incapacity/ Inexperience to manage the facilities	This will lead to poor operation and maintenance as well as deterioration of infrastructure as well as accidents due to lack of enough technical knowledge in safety requirements for equipment/machinery operation. Inadequate monitoring of environmental impacts of project activities.	Direct, Minor	Wide	Long term
Disturbance and interruption of commercial and social activities	Interference with commercial and social activities will be very low.	Direct, Minor	Limited	Temporary
Disturbance and interruption of commercial and social activities	Maintenance activities for the water distribution network may cause traffic disruptions and congestion, resulting in disturbance and interruption of commercial and social activities. Other infrastructure e.g. roads, sewer lines, drains may also be disrupted.	Direct, Minor	Limited	Temporary

10.6 Mitigation Measures

10.6.1 Mitigation hierarchy for the planned project activities

Avoid at source: Reduce at source
Avoiding or reducing at source is essentially "designing" the project so that a feature causing an impact is designed out (e.g. a pipeline re-routed) or altered (e.g. reduced working width). Often this is called minimization.

Abate on site
This involves adding something to the basic design to abate the impact – for example, pollution controls fall in this category. This is often called end-of-pipe.

Abate at receptor
If an impact cannot be abated on-site, then measures can be implemented off-site – an example of this would be to install double-glazed windows to minimize the impact of noise at a nearby residence.

Repair or Remedy
Some impacts involve unacceptable damage to a resource, e.g. agricultural land during pipeline construction. Repair essentially involves restoration and re-instatement type measures.

10.6.2 Pre-Construction

The majority of mitigation measures and in particular mitigations to protect and enhance the physical environment are most effectively incorporated during the design phase. There are five key elements:

- Development of sustainable designs with the lowest possible environmental impact within the constraints of the project funding and the socio-economic setting.
- Improved health and opportunities for the beneficiary populations from improved sanitation.
- Incorporate the recommendations and requirements of the ESMP to be an integral part of the Bidding and Contract Documents thereby building in enforceable measures to protect the environmental and social matters throughout the construction phase.
- Provide adequate grievance redress procedures to address the concerns of local people and stakeholders to ensure satisfactory resolution of any grievance arising from the project.
- Ensure adequate and fair compensation for involuntary resettlement for any party suffering inconvenience, financial or loss of livelihood due to being moved to accommodate the works, principally the laying of buried pipelines.

For each of the identified impacts, mitigation measures have been suggested in accordance with a general rule defining mitigation criteria as:

1. Avoidance of major impacts: major impacts are generally considered unacceptable, ones that would endure in the long-term or extend over a large area;
2. Reduction of major and moderate impacts to as low as reasonably practicable (ALARP) by planning, designing and controlling mitigation measures. This implies that mitigation measures will be applied until the limitations of cost effectiveness and practical application have been reached. The limitations are established by international practice;
3. Implementation of good practices for impacts rated as minor, in order to ensure that impacts are managed within good reason.

Generally, mitigation measures have been applied in the design of the project, through a hierarchy as described above. Similar considerations, in the context of ALARP, will apply to the ongoing development of the mitigation measures during detailed design.

There will only be localized short-term impacts during construction due to the implementation of the civil works. Impacts have been addressed at the design stage by choosing engineering solutions that, as far as is possible, minimize the impacts during construction. During the operational phase the project will deliver the intended benefits whilst the infrastructure will be hidden from view below ground.

The impacts which could not be eliminated by the design, mostly impacts during construction, will be reduced or eliminated by mitigation and monitoring measures specified in the ESMP. These construction related impacts can be mitigated by (i) the contractors' work practices, especially those related to maintenance of access, methods of trench excavation, the storage of construction materials and cleanliness of the work sites; (ii) cooperation by the local authorities with the contractor in terms of traffic management and use of public space and utilities; (iii) project management's strict enforcement of the correct construction practices and standards; (iv) the incorporation of the mitigation measures identified in the ESIA into the bid documents and specifications; (v) public awareness including liaison at ward level shortly in advance of work in each work location; and (vi) close monitoring of the contractor's implementation of the required mitigation measures.

Environmental impacts and proposed mitigation measures during project pre-construction, construction and operation phases are described in the following sections.

Table 10-3. Mitigation of impacts related to construction of pipeline.

Project component: Pipeline and reservoirs/storage tanks	
Construction phase	
Impact type	**Description of mitigation measures**
Air pollution	• Maintain vehicle and equipment according to manufacturers' specifications. • Use standard fuel and lubricants. • Avoid unnecessary car idling and switch off engines of vehicles and machinery while not in use • Sprinkle water to work areas to reduce and prevent dust during dry weather periods. • Clean access routes in surrounding area on a daily basis to prevent dust. • Collect and hold cleaning wastes (e.g. rags) in appropriate containers. • Workers who may unavoidably have to work in dusty workplaces should be provided with nose and ear masks to protect them from excessive dust.
Noise pollution	• Minimise noise according to NEMA, Kenyan standards and World Bank guidelines. • Control noise and vibration on site. • Work programmes should be provided to local communities (e.g. through the local radio (FM) stations) and strictly followed. • Maintain vehicle and equipment according to manufacturers' specifications. • Install adequate noise prevention devices, e.g. mufflers on noise generating sources. • Switch off engines of vehicles and machinery while not in use. • Workers who may unavoidably have to work with noise generating equipment, e.g. earthmoving equipment should be provided with ear plugs and advised to put them on.
Water and soil pollution	• No solid waste, fuels or oils should be discharged into surface water bodies. • The contractor following the guidelines for management of materials and wastes during construction and operation should take care of preventing the project from damaging the surface water bodies. • Hold and store cleaning wastes in appropriate containers to be disposed of at approved sites. • Vehicles should preferably be parked on paved platforms. • Fuel storages should not leak, and should be periodically monitored, and repaired or replaced when necessary. • Maintain fuel and clean vehicles and equipment at workshops/sites with adequate leakage prevention (e.g. impermeable surface, settlers and oil separator).

Soil erosion and contamination	• Remove and store topsoil in separate piles and reinstate after refilling of trenches, to enable natural re-vegetation. • The Contractor(s) should present procedures for, and ensure implementation of measures to protect soils from any accidental or structural contamination. These include: • Storing all hazardous, sanitary and cleaning wastes in facilities approved by NEMA. • Installing leak-proof fuel storages on concrete platform with gutters and grease separators, which are monitored periodically and repaired or replaced when required. • Strict enforcement and monitoring standard procedures for storing and handling hazardous wastes and raw material (e.g. fuel or chemicals). • Placing strong drums for oil storage on impermeable floors in the stores. • Parking vehicles on paved platforms whenever possible. • Ensuring that sites for cleaning, fuelling and maintaining equipment and vehicles should be able to prevent leakage (e.g. paved or with settlers). • Isolating contaminated soil and treating /disposing it off in a way that will depend on the contaminant type.
Solid waste generation	• The Contractor should prepare a Solid Waste Management Plan, which should contain: • An inventory of the types and quantities of waste to be produced. • The most appropriate waste management approach for each type of waste including details on (temporary) storage, transport and final destination of the waste. • An assessment of any opportunities for reducing solid waste generation, in particular of hazardous and undesirable (persistent and non-reusable) types of wastes. • The Contractor should maintain records of types, quantities, origin, (temporary) storage, transport and elimination/reuse of solid waste, and make these available to the works supervisor upon his request, as proof of proper waste management practices. • Any waste including excess soil should be disposed of at gazetted sites. The solid waste shall not accumulate on site, to cause odour, fly, or rodent problems. • Excavated soils should be reused as much as possible as filling material and should be contained after excavation. • Provisional material storage on site should be designed and undertaken in such a way as to ensure that soils and underground water are not polluted. • Use licensed recycling companies to externally recycle, recover or dispose of waste.
Impacts on flora and fauna	• Zone out working areas to reduce ecological destruction, • Restore disturbed natural sites through environmental rehabilitation; restoring top soils and (re-)introduce genetic species

	similar to those destroyed in order to re-establish the natural local ecology.
Public Safety	• Ensure that work sites (especially excavation works), have proper protection with clear marking of safety borders and signals and fence off all dangerous areas. • Inform neighbours about the construction programme in advance and adhere to it. • Confine access to restricted work sites (including those with operation of mechanical and electric equipment) to persons with permits. • Implement appropriate traffic plans with the help of local police when (partial) closure of roads is required.
Public health problems Including increased vehicular traffic	• Fill up all depressions to avoid pools of stagnant water may form in pits, holes and excavated ditches which can create suitable habitats for insect disease vectors such as mosquitoes which cause malaria. • Inform local communities about the construction programme in advance. • In case access roads have to be closed, inform local communities and road users in advance. • Use reflective signature to direct traffic to designated areas. • Use flag men/women to give directions to traffic. • Sensitise drivers to observe speed limits
Raw material use	• Consider environmental performance of suppliers of raw material in the selection process. • Explore ways of reducing raw material use. • Special emphasis should be made on raw materials that may be reused and/or recycled/recovered
Occupational health and safety	• Ensure that work sites (especially excavation works), especially in the night have proper protection with clear marking of safety borders and signals and fence off all dangerous areas. • Carry out training of staff in EH&S monitoring and evaluation. • The contractor should recruit H&S person during construction. • Inform neighbours about the construction programme in advance and adhere to it. • Confine access to restricted work sites (including those with operation mechanical and electric equipment) to persons with permits. • The contractor will ensure clear human resources policy against sexual harassment that is aligned with national law • The contractor will integrate provisions related to sexual harassment in the employee COC • The contractors will ensure appointed human resources personnel to manage reports of sexual harassment according to policy • The contractor will ensure comply to provisions of Work Place Injuries and Benefits Act (WIBA) 2007 • Provide sex-segregated clean toilets for male and female workers • Undertaking training and capacity building for all workers on use

	of chemicals • Provide PPE to all workers using chemicals.
Disturbance and interruption of commercial and social activities	• Inform local communities about the construction programme in advance and adhere to it. • In case access roads have to be closed, inform local communities in advance. • Clean and maintain access roads in the neighbourhood of earth and sand on a daily basis. • Provide temporary access ways with the approval of local authorities where access roads are closed. • Carry out work under mild weather; avoid strong rains or winds. • Reduce obstruction of access to and use and occupation of roads, footpaths and bridges. • Protect any items and/or sites of archaeological or cultural value discovered during works with the aid of the appropriate authorities. • Where livelihoods and property are affected, valuation and prompt compensation be undertaken for the PACs
Disruption of social order and prevention of HIV/AIDS and other sexually transmitted diseases	• Sensitise all workers to ensure awareness of and sensitivity to the local cultures, traditions and lifestyles, • Implement the HIV/AIDS impact mitigation plan that will involve providing a comprehensive range of services including the identification of possible HIV/AIDS cases, testing with pre- and post-counselling, the treatment of associated infections, referral of appropriate cases, education to promote better quality of life and promotion of precautions, provision of condoms and the application of HIV/AIDS occupational exposure policies. • Sensitize workers and the surrounding communities on awareness, prevention and management of HIV/AIDS through staff training, awareness campaigns, multimedia and workshops or during community barazas. • Provide information, education and communication about safe uses of drinking water. • Provide an on-site clinic to provide Voluntary Counselling and Testing (VCT) services to construction crew and provision of Anti-Retroviral (ARVs) for vulnerable community members • Integrate monitoring of HIV/AIDS preventive activities as part of the construction supervision. Basic knowledge, attitude and practices are among the parameters to be monitored, and particularly on provision of condoms, status testing and use of ARVs, as well as sexual health and rights • Ensure safety of women and girls in provision of VCT services
Sexual Exploitation and Abuse of Community Members by project workers	• Develop and implement and SEA action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept

	2018).
	- The SEA action plan will include how the project will ensure necessary steps are in place for:
	  - Prevention of SEA: including COCs and ongoing sensitization of staff on responsibilities related to the COC and consequences of non-compliance;
	  - Response to SEA: including survivor-centered multi-sectoral referral and assistance to complainants; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level
	  - Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights;
	Management and Coordination: including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle blower protection; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points and trained community liaison officers.

Gender Based Violence at Community Level	- Develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including:
	  - effective and on-going community engagement and consultation, particularly with women and girls;
	  - review of specific project components that are known to heighten GBV risk at the community level, e.g. compensation schemes; employment schemes for women; delivery of water supplies; etc.
	  - Specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to compensation and employment; water services; etc
	Ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation.

Violence against Children (VAW)	- Develop and implement a Children Protection Strategy that will ensures minors are protected against negative impacts associated by the Project. - All staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behavior Children under the age of 18 years shall not be hired on site as provided by Child Rights Act (Amendment Bill) 2014
Labour Influx	- Preparation of Influx Management Plan by contractor - Preparation of Labour and Recruitment Plan by contractor

	Preparation of a "code of conduct for workers". This code of conduct will be signed and followed by all workers involved in the project.
Visual amenities	• Do not pile excavated soil to form high stockpiles for long durations, • Clean up the site upon completion of the work.

Table 10-4. Mitigation of impacts related to operation of pipeline

Project component: Pipeline and reservoirs/storage tanks	
Operation phase	
Impact type	**Description of mitigation measures**
Air pollution	• Maintain vehicle and equipment according to manufacturers' specifications. • Use standard fuel and lubricants. • Avoid unnecessary car idling and switch off engines of vehicles and machinery while not in use • Sprinkle water to work areas to reduce and prevent dust during dry weather periods. • Clean access routes in surrounding area on a daily basis to prevent dust. • Collect and hold cleaning wastes (e.g. rags) in appropriate containers. • Workers who may unavoidably have to work in dusty workplaces should be provided with nose and ear masks to protect them from excessive dust.
Noise pollution	• Minimise noise according to NEMA, Kenyan standards and World Bank guidelines. • Control noise and vibration on site. • Work programmes should be provided to local communities (e.g. through the local radio (FM) stations) and strictly followed. • Maintain vehicle and equipment according to manufacturers' specifications. • Install adequate noise prevention devices, e.g. mufflers on noise generating sources. • Switch off engines of vehicles and machinery while not in use. • Workers who may unavoidably have to work with noise generating equipment, e.g. earthmoving equipment should be provided with ear plugs and advised to put them on.
Water and soil pollution	• No solid waste, fuels or oils should be discharged into surface water bodies. • The contractor following the guidelines for management of materials and wastes during construction and operation should take care of preventing the project from damaging the surface water bodies. • Hold and store cleaning wastes in appropriate containers to be disposed of at approved sites. • Vehicles should preferably be parked on paved platforms. • Fuel storages should not leak, and should be periodically

	monitored, and repaired or replaced when necessary. • Maintain fuel and clean vehicles and equipment at workshops/sites with adequate leakage prevention (e.g. impermeable surface, settlers and oil separator).
Soil erosion and contamination	• Remove and store topsoil in separate piles and reinstate after refilling of trenches, to enable natural re-vegetation. • The Contractor(s) should present procedures for, and ensure implementation of measures to protect soils from any accidental or structural contamination. These include: • Storing all hazardous, sanitary and cleaning wastes in facilities approved by NEMA. • Installing leak-proof fuel storages on concrete platform with gutters and grease separators, which are monitored periodically and repaired or replaced when required. • Strict enforcement and monitoring standard procedures for storing and handling hazardous wastes and raw material (e.g. fuel or chemicals). • Placing strong drums for oil storage on impermeable floors in the stores. • Parking vehicles on paved platforms whenever possible. • Ensuring that sites for cleaning, fuelling and maintaining equipment and vehicles should be able to prevent leakage (e.g. paved or with settlers). • Isolating contaminated soil and treating /disposing it off in a way that will depend on the contaminant type.
Solid waste generation	• The Contractor should prepare a Solid Waste Management Plan, which should contain: • An inventory of the types and quantities of waste to be produced. • The most appropriate waste management approach for each type of waste including details on (temporary) storage, transport and final destination of the waste. • An assessment of any opportunities for reducing solid waste generation, in particular of hazardous and undesirable (persistent and non-reusable) types of wastes. • The Contractor should maintain records of types, quantities, origin, (temporary) storage, transport and elimination/reuse of solid waste, and make these available to the works supervisor upon his request, as proof of proper waste management practices. • Any waste including excess soil should be disposed of at gazetted sites. The solid waste shall not accumulate on site, to cause odour, fly, or rodent problems. • Excavated soils should be reused as much as possible as filling material and should be contained after excavation. • Provisional material storage on site should be designed and undertaken in such a way as to ensure that soils and underground water are not polluted. • Use licensed recycling companies to externally recycle, recover or

	dispose of waste.
Impacts on flora and fauna	• Zone out working areas to reduce ecological destruction, • Restore disturbed natural sites through environmental rehabilitation; restoring top soils and (re-)introduce genetic species similar to those destroyed in order to re-establish the natural local ecology.
Public Safety	• Ensure that work sites (especially excavation works), have proper protection with clear marking of safety borders and signals and fence off all dangerous areas. • Inform neighbours about the construction programme in advance and adhere to it. • Confine access to restricted work sites (including those with operation of mechanical and electric equipment) to persons with permits. • Implement appropriate traffic plans with the help of local police when (partial) closure of roads is required.
Public health problems Including increased vehicular traffic	• Fill up all depressions to avoid pools of stagnant water may form in pits, holes and excavated ditches which can create suitable habitats for insect disease vectors such as mosquitoes which cause malaria. • Inform local communities about the construction programme in advance. • In case access roads have to be closed, inform local communities and road users in advance. • Use reflective signature to direct traffic to designated areas. • Use flag men/women to give directions to traffic. • Sensitise drivers to observe speed limits
Raw material use	• Consider environmental performance of suppliers of raw material in the selection process. • Explore ways of reducing raw material use. • Special emphasis should be made on raw materials that may be reused and/or recycled/recovered
Occupational health and safety	• Ensure that work sites (especially excavation works), especially in the night have proper protection with clear marking of safety borders and signals and fence off all dangerous areas. • Carry out training of staff in EH&S monitoring and evaluation. • The contractor should recruit H&S person during construction. • Inform neighbours about the construction programme in advance and adhere to it. • Confine access to restricted work sites (including those with operation mechanical and electric equipment) to persons with permits.
Disturbance and interruption of commercial and social activities	• Inform local communities about the construction programme in advance and adhere to it. • In case access roads have to be closed, inform local communities in advance. • Clean and maintain access roads in the neighbourhood of earth and sand on a daily basis.

	• Provide temporary access ways with the approval of local authorities where access roads are closed. • Carry out work under mild weather; avoid strong rains or winds. • Reduce obstruction of access to and use and occupation of roads, footpaths and bridges. • Protect any items and/or sites of archaeological or cultural value discovered during works with the aid of the appropriate authorities.
Disruption of social order and prevention of HIV/AIDS and other sexually transmitted diseases	• Sensitise all workers to ensure awareness of and sensitivity to the local cultures, traditions and lifestyles, • Implement the HIV/AIDS impact mitigation plan that will involve providing a comprehensive range of services including the identification of possible HIV/AIDS cases, testing with pre- and post-counselling, the treatment of associated infections, referral of appropriate cases, education to promote better quality of life and promotion of precautions, provision of condoms and the application of HIV/AIDS occupational exposure policies.
Visual amenities	• Do not pile excavated soil to form high stockpiles for long durations, • Clean up the site upon completion of the work.

11.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

11.1 OBJECTIVES OF THE ESMP

The objectives of the Environmental and Social Management Plan (ESMP) are to:

- Proposing mitigation measures minimizing the magnitude of impact generation due to project implementation;
- Recommending measures which will reduce each environmental and social impact considered to be significant enough to require a degree of control;
- Comply with all the environmental laws and regulations of the GOK and Good International industry practices and safeguards policies;

Develop a monitoring plan which will:

- Establish baseline conditions for comparison purposes;
- Monitor the performance of the Project and effectiveness of mitigation measures;
- Determine compliance with regulatory framework; and
- Provide for remedial actions in cases where monitoring identifies a shortfall in targets for which corrective action is possible;
- Achieve sustainable and environmentally and socially acceptable development interventions for the Sabor irrigation development Project; and
- Inform NIB and the contractors on environmental management strategies.

In order to achieve the above objectives, the following have been taken into account during the formulation of the ESMP:

- Outlining measures to be adopted in project planning and design to avoid or minimize adverse impacts on the environment and affected communities,
- Formulating specific mitigation measures to avoid or minimize the adverse impacts of pre-construction, construction, and post-construction phases of the Project;
- Preparing a plan to monitor the implementation of the mitigation measures and their effectiveness in combating the adverse impacts; and
- Establishing an institutional mechanism for ESMP implementation, monitoring, and reporting.

11.2 PROJECT ACTIVITIES

The Sabor irrigation Project will be implemented through a number of sub-projects with the broad objectives to:

- Promote equity in service provision, increase financial self-sufficiency of the NIB project; and support economic growth by assuring the irrigation water supply provision achieves economies and efficiencies to deliver services to current and future consumers (domestic and industrial) in a reliable and cost-effective manner.

Construction activities will inevitably result in increased noise and potential air and water pollution during the limited period required to execute the works at any one location. Further waste materials from the works will need to be disposed which may have adverse impacts on the environment. The actual levels of impact will depend on the nature and type of the construction activity to be performed.

11.3 ENVIRONMENTAL MANAGEMENT SPECIFICATIONS

The Project contract documents will specify that the construction works contractors and NIB will implement the ESMP. The NIB will monitor the implementation of the ESMP. In order to facilitate the

implementation process during the construction phase, environmental and social safeguard specifications which are harmonized with the ESMP have been incorporated into the Contract Document for the Works. The PRE-will take the role of Engineer for construction supervision and therefore the day to day enforcement of the environmental and social safeguards.

11.4 COST OF MITIGATION MEASURES

An allowance for environmental and social mitigation measures has been included in all cost estimates. Furthermore, incorporation of mitigation measures into the project designs has been part of the design process and is included in the design cost itself. The costs are incorporated into the Bill of Quantities work items for the estimates and for the unit rates which must be inserted by the bidding contractors. Therefore, the mitigation action to be implemented during the construction phase will be part of the construction activities and the costs are included in the construction costs.

11.5 ESMP

The ESMP is presented in tabulated form at Appendix B. It is divided into the three project Phases:

1. Design;
2. Construction;
3. Operation and decommissioning

11.6 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

11.6.1 Requirements

Environmental and social monitoring is an essential component of the ESMP. It is necessary in order to ascertain whether the mitigation measures are implemented properly and whether the implemented measures are capable of mitigating the adverse impacts as intended.

Environmental and social monitoring is mainly compliance and impact monitoring; this includes compliance with the conditions stipulated in the decision letter from NEMA granting approval for the project, but also compliance with World Bank safeguards policies.

The Environmental and Social Monitoring Plan (ESMoP) provides the general guidance on the monitoring requirements of the ESMP. Monitoring will be implemented during construction and operational phases of the project. Monitoring will focus on the actual implementation of the mitigation measures contained in the ESMP and the status of compliance with the World Bank safeguards policies.

11.6.2 The ESMoP

The ESMoP is presented in table 50 below and describes for specific potential impacts the methods to be used for environmental and social monitoring, specifically for each:

1. Parameters to be monitored;
2. Target standards;
3. Monitoring method;
4. Monitoring locations;
5. Frequency of monitoring;
6. Cost (budget head); and
7. Responsibility for oversight.

The following specific potential impacts are included in the ESMoP:
For the construction phase:

1. Soil erosion;
2. Soil contamination;
3. Surface water pollution;
4. Air and dust pollution;

5. Noise;
6. Use of hazardous materials;
7. Vehicle and pedestrian safety;
8. Community health and safety
9. Occupational health and safety; Occupational health and safety, including sexual harassment between project workers;
10. Gender-based violence at the community level
11. Sexual exploitation and abuse by project workers against community members
12. Child labour and protection

For the operational phase:

1. Soil erosion;
2. Soil contamination;
3. Surface water pollution;
4. Air and dust pollution;
5. Noise;
6. Use of hazardous materials;
7. Vehicle and pedestrian safety;
8. Community health and safety
9. Occupational health and safety; and
10. Worker welfare;

11.6.3 Conduct of the plan

The ESMoP will be conducted to ensure that all parties take the specified action to provide the required mitigation, to assess whether the action has adequately protected human health and the environment, and to determine whether any additional measures may be necessary.

11.6.4 Post-Assessment Environmental Audits

NIB will conform to NEMA requirements and will apply international principles (ISO19011) to conduct environmental and social audits. These include:

1. Ethical conduct;
2. Fair presentation;
3. Due professional care;
4. Independence; and
5. Evidence-based approach.

These will be applied during audit process, the systematic, independent and documented process for obtaining audit evidence (what is actually occurring or has occurred: based on observations, verifiable records reviewed or interviews with people to generate objective evidence) and evaluating it objectively to determine the extent to which the audit criteria (NEMA regulatory requirements as stipulated by World Bank safeguards policies; all these reflected in mitigation measures in ESMPs) are fulfilled.

NEMA's EIA/EA regulations (2003) require that there shall be undertaken an environmental audit of the project within a period of not less than twelve months and not more than thirty-six months after the completion of the project or the commencement of its operations, whichever is earlier. However, NEMA may ask the developer to undertake an environmental audit at any time for any purpose. The environmental audit must be carried out by qualified persons from those who prepared the environmental impact statement and where this is not possible, by persons whose names and qualifications have been approved by NEMA for the purpose.

NEMA may, after the environmental audit, require NIB to carry out specified remedial actions and further

audits at such times as the NEMA considers necessary. An environmental audit report shall be prepared after each audit and shall be submitted to the NEMA by NIB within such time as the NEMA may determine.

An NEMA inspector may at all reasonable times enter upon any land, premises or other facility related to the Sabor irrigation Project to undertake investigations relating to the implementation of any condition or measure to be taken following an environmental audit. The inspector may examine and make copies of records and exercise all or any of powers provided for under the regulations.

11.6.5 NIB project management team

The NIB through the NIB project team shall provide oversight function to ensure the environmental and social safeguards requirements of the NEMA are complied with.

11.6.6 Contractors

The contractors shall be responsible for the actual implementation of the project ensuring its performance meets the required standards and quality of workmanship. The contractors shall be required to prepare and submit Contractor's Environmental and Social Management Plan (CESMP) consistent with the project ESMP. In addition, the Contractor shall ensure that employment opportunities are maximized for qualified local residents (both male and female) and those employees receive monetary compensation consistent with the employment laws of Kenya. The contractor monthly reporting requirements shall include an environmental and social safeguards section for verification by the Project Resident Engineer (PRE). The Contractor shall likewise immediately address environmental and social concerns brought to its attention by concerned stakeholders. Corrective measures shall be to the satisfaction of the stakeholders concerned. The contractor shall hire a GBV consultant who will be responsible for handling gender-based violence issues, sexual abuse and exploitation etc.

11.6.7 Contractor's ESMP (CESMP)

The requirement to prepare the CESMP is included in the Technical Specifications of the Bidding Documents. Specifications for the CESMP and Health and Safety Plan are included in the Bidding Documents.

11.7 RESPONSIBILITIES

11.7.1 General View

Precautions to ensure that damages to the environment are minimized calls for a concerted effort from the project management, the Contractor(s) and all stakeholders. The Resident Engineer is expected to discuss and convey the contents of this management plan, recommended mitigation/interventions outlined under the impact, instructions from National Environment Management Authority (NEMA) as well as the wishes of the affected stakeholders to the Contractor and construction workers for integration in the construction process. The County NEMA Office will also be involved to take advantage of the valuable information on the environmental trends in the area.

Some stakeholders might find the road construction period an inconvenience to their daily activities and safety, though the opinion on the long-term benefits from the road project is positive. In this regard, they will need to be involved in the project monitoring framework through good relations between the contractor and the stakeholders and through timely information on the construction schedules, duration of construction works, potential interference with their daily activities and other issues arising. This will also help in resolving of problems related to construction and prevention of possible social conflicts associated with the project. Communication channels should always be open to ensure proper and timely responses to any complaints that may arise from the road project. Specific responsibilities will be as follows

11.7.2 NIB Responsibility

The Environmental and Social division at NIB will facilitate compliance of the with environmental regulations. The office will advise on the projects on compliance and is also a direct liaison with NEMA. Projects concerns will reach this office directly or through the supervisor while on the other, NEMA (or any other environmental stakeholder) is expected to address the project related issues through the same office.

11.7.3 NEMA Functions

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.
ders (village elders), landowners, institutions, business people, vulnerable groups, youth, etc.

The Committee will comprise of a Chair and a Secretary and will be open a file with the Resident Engineer and the Contractor. Main focus of the Committee will be on;
(i) Land acquisition issues,
(ii) Health and safety
(iii) Pressure on resources and amenities
(iv) Environmental quality including noise and air quality,
(v) Access passages and drainage channels blockages.

Table 11-1. Environmental and Social Management Plan

PHASE/ IMPACT TYPE	POTENTIAL IMPACT	MITIGATION MEASURES	MONITORING INDICATOR	RESPONSIBILITY/BUDGET	MONITORING INSTITUTION
Construction Phase (waterworks, construction of reservoirs, storage tanks)					
A1. Air pollution	Emissions from vehicles and construction equipment.	A1-1: Maintain vehicle and equipment according to manufactures' specifications. A1-2: Use standard fuel and lubricants.	-Record of repairs -Fuels and lubricants conforming to specifications	Contractor	NEMA, NIB and Supervising Engineer
		A1-3: Sprinkle water to work areas to reduce and prevent dust during dry weather periods.	-Record of water sprinkling	Contractor	NEMA, NIB and Supervising Engineer
		A1-4: Clean access routes in surrounding area on a daily basis to prevent dust.	Record of cleaning	Contractor	NEMA, NIB and Supervising Engineer
		A1-5: Collect and hold sanitary and cleaning wastes in appropriate container.	-Designated sanitary containers	Contractor	NEMA, NIB and Supervising Engineer
		A1-6: Workers who may unavoidably have to work in dusty workplaces should be provided with nose and ear masks to protect them from excessive dust.	-PPEs Distribution list/stores, percentage of workers using nose and ear masks	Contractor	NEMA, NIB and Supervising Engineer
A2. Noise pollution	Intermittent noise from vehicles and equipment to sensitive receptors	A2-1: Minimize noise according to NEMA, Kenya standards and World Bank guidelines. A2-2: Control noise and vibration on site. A2-3: Install adequate noise prevention devices, e.g. mufflers on noise generating sources.	-Noise making machines/equipment fitted with mufflers -Record of noise measurements	Contractor	NEMA, NIB and Supervising Engineer
		A2-4: Maintain vehicle and equipment according to manufactures‟ specifications.	-Record of vehicle and equipment maintenance	Contractor	NEMA, NIB and Supervising Engineer
		A2-5: Switch off engines of vehicles and machinery	-Equipment log sheets	Contractor	NEMA, NIB and Supervising Engineer

		while not in use.			
		A2-6: Provide information to the local communities (e.g. through the local system or local radio (FM) stations) with regard to work programme, and strict adherence to such.	-Receipts from radio stations for announcements made	Contractor	NEMA, NIB and Supervising Engineer
		A2-7: Workers who may unavoidably have to work with noise generating equipment, e.g. earth-moving equipment should be provided with ear plugs and advised/monitored to put them on.	-Store of PPEs including nose and ear masks	Contractor	NEMA, NIB and Supervising Engineer
A3 Water pollution	Water pollution from waste, dredging activities, accidental spillage of fuel, lubricants, sediment run-off	A3-1: Contain solid wastes so that no solid waste, fuels or oils should be discharged into surface water bodies.	-Monitoring reports on status of waste management	Contractor	NEMA, NIB and Supervising Engineer
		A3-3: Hold and store sanitary and cleaning wastes in appropriate containers to be disposed of at approved sites.	-Designated sanitary containers	Contractor	NEMA, NIB and Supervising Engineer
		A3-4: Park vehicles preferably on paved platforms A3-5: Fuel storages should not leak, and should be periodically monitored, and repaired or replaced when necessary. A3-6: Sites for cleaning, fuelling and maintaining vehicles should be able to prevent leakage (e.g. paved). A3-7: Maintain fuel and clean vehicles and equipment at workshops/sites with adequate leakage prevention (e.g. impermeable surface,	-Monitoring reports on parking of vehicles and status of fuel storages	Contractor	NEMA, NIB and Supervising Engineer

		settlers and oil separator). A-3-8. Cover backfill material when not used as backfill on same day; stop works when there is extreme rains leading to flooding;			
A4 Soil erosion and contamination		A4-1: Carry out work under mild weather (not strong rains or winds). A4-2: Contaminated soil should be isolated and treated/disposed of in a way that will depend on the contaminant type. A4-3: Remove and store topsoil in separate piles and reinstate after refilling of trenches, to enable natural revegetation. Cover backfill material when not used as backfill on same day; stop works when there is extreme rains leading to flooding;	-Stockpiles of topsoil -Written down soil protection measures and record of implementation -Results of chemical analysis of treated soils	Contractor	NEMA, NIB and Supervising Engineer
		A4-4: Storing all hazardous, sanitary and cleaning wastes in facilities approved by NEMA. A4-5: Installing leak-proof fuel storages on concrete platform with gutters and grease separators, which are monitored periodically and repaired or replaced when required.	-Monitoring reports, -Operational store	Contractor	NEMA, NIB and Supervising Engineer
		A4-6: Strictly enforce and monitor standard procedures for storing and handling hazardous wastes and raw material (e.g. fuel or chemicals).	-Monitoring reports	Contractor	NEMA, NIB and Supervising Engineer
		A4-7: Place strong drums for	-Designated sanitary	Contractor	NEMA, NIB and

		oil storage on impermeable floors in the stores. A4-8: Provide appropriate hoses for refuelling of pumps and vehicles.	containers		Supervising Engineer
		A4-9: Parking vehicles on paved platforms whenever possible A4-10: Sites for cleaning, fuelling and maintaining equipment and vehicles should be able to prevent leakage (e.g. paved or with settlers).	-Monitoring reports on parking of vehicles and status of fuel storages	Contractor	NEMA, NIB and Supervising Engineer
		A4-11: Treat wastewater from maintenance workshops in oil separators before discharge to sewers.	-Reports on water quality analyses	Contractor	NEMA, NIB and Supervising Engineer
A5: Solid waste generation	Cleared vegetation may compromise aesthetic value of the sites;	A5-1: The Contractor should prepare a Solid Waste Management Plan, as described this report.	-Written down Solid Waste Management Plan (SWMP) and Implementation schedule	Contractor	NEMA, NIB and Supervising Engineer
		A5-2: The contractor should maintain records of types, quantities, origin, (temporary) storage, transport and elimination/reuse of solid waste A5-3: Any waste including excess soil should be disposed of at gazetted sites. The solid waste shall not accumulate on site, to cause odour, fly, or rodent problems.	-Records of types of wastes generated, transport and delivery to gazette sites	Contractor	NEMA, NIB and Supervising Engineer
		A5-4: Excavated soils should be reused as much as possible as filling material	-No visible soil stockpiles -Depressions filled	Contractor	NEMA, NIB and Supervising Engineer
		A5-5: Provisional material storage on site should be	-Sealed storage containers on site	Contractor	NEMA, NIB and Supervising Engineer

		designed and undertaken in such a way as to ensure that soils and underground water are not polluted.			
		A5-6: Use licensed recycling companies to externally collect and recycle, recover or dispose off waste	-Contracts with licensed waste disposal/recycling firms	Contractor	NEMA, NIB and Supervising Engineer
A6: Impacts on flora and fauna	Plants and associated fauna may be affected	A6-1: Zone out working areas to reduce ecological destruction.	-Zoned out areas	Contractor	NEMA, NIB and Supervising Engineer
		A6-2: Agree with and compensate owners of fruit and commercial trees	-Written agreement with the owners and indication the amount of money to paid for the compensation of the trees.	Contractor	NEMA, NIB and Supervising Engineer
		A6-3: Restore disturbed natural sites through environmental rehabilitation; restoring top soils and (re-)introduce genetic species similar to those destroyed in order to re-establish the natural local ecology.	-Disturbed sites restored after well completion	Contractor	NEMA, NIB and Supervising Engineer
A7: Public Safety	Excavations, and transportation of equipment, site workers and debris and movement of heavy equipment may pose a safety risk to the general public	A7-1: Ensure that work sites (especially excavation works), have proper protection with clear marking of safety borders and signals and fence off all dangerous areas	-Demarcated work sites and signals	Contractor	NEMA, NIB and Supervising Engineer
		A7-2: Inform communities about the construction programme in advance	-Written communication to neighbouring communities -Receipts from radio stations for announcement	Contractor	NEMA, NIB and Supervising Engineer
		A7-3: Confine access to restricted work sites (including those with operation of mechanical and electric equipment) to	-Security guards to restrict access	Contractor	NEMA, NIB and Supervising Engineer

		persons with permits.			
		A7-4: Implement appropriate traffic plans with the help of local police when (partial) closure of roads is required	-A Traffic Management Plan	Contractor	NEMA, NIB and Supervising Engineer
A8: Raw material use	Quantities of construction material will be involved, for example, cement, steel, oil fuel, pipe materials (e.g. PVC, uPVC, concrete and/or steel). Also, large quantities of local materials, e.g. sand, gravel will be involved. If not well stored and utilized, as well as instituting management measures for waste materials, they can contaminate the environment	A8-1: Consider environmental performance of suppliers of raw material in the selection process. A8-2: Explore ways of reducing raw material use. A8-3: Special emphasis should be made on raw materials that may be reused and/or recycled/recovered.	-List of suppliers for raw materials -Records of raw materials used	Contractor	NEMA, NIB and Supervising Engineer
A9: Public health problems	Pools of stagnant water may form in pits, holes and excavated ditches which can create suitable habitats for insect disease vectors such as mosquitoes. People may fall in ditches and be injured	A9-1: Fill up all depressions to avoid pools of stagnant water that may form in pits, holes and excavated ditches which can create suitable habitats for insect disease vectors such as mosquitoes which cause malaria.	-All excavated potential depressions re-instated, filled and re-vegetated.	Contractor	NEMA, NIB and Supervising Engineer
		A9-2: Mark all dangerous areas and fence them off. A9-3: Restrict access to work areas by unauthorized persons	-All dangerous areas fenced off and warning signs -Written communication to Neighbouring communities -Security guards to restrict access	Contractor	NEMA, NIB and Supervising Engineer
A10: Spread of communicable diseases and HIV/AIDS infection	Spread of communicable diseases and HIV/AIDS infection	• Sensitize workers and the surrounding communities on awareness, prevention	• Interview staff and community members • Training attendance	Contractor	NEMA, NIB and Supervising Engineer

		and management of HIV/AIDS through staff training, awareness campaigns, multimedia and workshops or during community barazas. • Provide information, education and communication about safe uses of drinking water. • Provide an on-site clinic to provide Voluntary Counselling and Testing (VCT) services to construction crew and provision of Anti Retroviral (ARVs) for vulnerable community members • Integrate monitoring of HIV/AIDS preventive activities as part of the construction supervision. Basic knowledge, attitude and practices are among the parameters to be monitored, and particularly on provision of condoms, status testing and use of ARVs, as well as sexual health and rights • Ensure safety of women and girls in provision of VCT services • Provision of condoms, contraceptives and	lists • Number of Trainings Held • Number of community members and workers in attendance in trainings		

		mosquito nets. • Conduction of campaign meetings on transmission of diseases like HIV/AIDS and other STDs.			
A11: Occupational health and safety	Exposure of workers to occupational health and safety hazards from activities such as: excavations; working with heavy equipment; working under noisy conditions, working in confined spaces; lifting of heavy objects; storage, handling and use of hazardous substances and wastes.	A11-1: Ensure that work sites (especially excavation works), especially in the night have proper protection with clear marking of safety borders and signals and fence off all dangerous areas	-Written down Health and Safety Management Plan (HSMP) including the suggested mitigation measures with a HSMP Committee to oversee its implementation	Contractor	NEMA, NIB and Supervising Engineer
		A11-2: Inform riparian neighbours about the construction programme in advance.	Written communication to neighbouring communities -Receipts from radio stations for announcement	Contractor	NEMA, NIB and Supervising Engineer
		A11-3: Confine access to restricted work sites (including those with operation mechanical and electric equipment) to persons with permits.	-Presence of security guards	Contractor	NEMA, NIB and Supervising Engineer
		A11-4: Train NIB staff and contractor staff in Environment and Safety. • SH Policy • SH provisions in CoC • Discrete SH reporting pathway • The contractor will ensure that clear human resources policy against sexual harassment that is aligned with national	-Presence of trained staff in E&S -Number of trainings for staff on SH -HR trained in SH -Number of fatalities and accidents recorded in the incidence book -Interview project staff and management -Compliance with SH provisions in CoC -Physical inspection	Contractor	NEMA, NIB and Supervising Engineer

		law • The contractor will integrate provisions related to sexual harassment in the employee COC • The contractors will ensure appointed human resources personnel to manage reports of sexual harassment according to policy • The contractor will ensure comply to provisions of Work Place Injuries and Benefits Act (WIBA) 2007 • Provide sex-segregated clean toilets for male and female workers • Undertaking training and capacity building for all workers on use of chemicals • Provide PPE to all workers using chemicals.	-Training attendance lists -Documentation of fatalities and accidents		
A12: Sexual exploitation and abuse by project workers against community members	Sexual exploitation and abuse by project workers against community members	Develop and implement an SEA plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice	• Review monthly minutes from SEA coordination meetings • Interviews with	Contractor	NEMA, NIB and Supervising Engineer

		Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018). The SEA action plan will include how the project will ensure necessary steps are in place for: • Prevention of SEA: including COCs and ongoing sensitization of staff on responsibilities related to the COC and consequences of non-compliance; project-level IEC materials; • Response to SEA: including survivor-centered coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management; • Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA	staff and local community • Code of Conduct • Number of staff trainings • SEA FP • Community Liaison Officer trained in PSEA • IEC materials for workers sites and community • Discrete SEA reporting pathway • Relevant policies, e.g. investigations and discipline and whistle blower protection		

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

A13: Gender-based violence at the community level	Gender-based violence at the community level	The contractor will implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including: • Effective and on-going community engagement a consultation, particularly with women and girls; • Review of specific project components that are known to heighten GBV risk at the community level, e.g. compensation schemes for women, employments schemes for women, etc.; • Specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to compensation and employment The contractor will ensure adequate referrals mechanisms are in place if a case of GBV at the community level is reported related to project implementation • GBV Action Plan • Mitigation plan for GBV occurring at the	• Interview staff and community members • Liaise with other stakeholders • Training attendance lists • Documentation of SEA cases • Consultations with community members, women and girls • GBV Risk Assessment	Contractor	NEMA, NIB and Supervising Engineer

		community level as a result of project implementation • Discrete GBV reporting pathway • Number of GBV cases at the community level that receive survivor-centered referral and care			
A14: Violation of children rights by contractor and labour force on site	Violation of children rights by contractor and labour force on site	The contractor will develop and implement a Children Protection Strategy that will ensures minors are protected against negative impacts associated by the Project. All staff of the project must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behaviour Children under the age of 18 years should NOT be hired on site as provided by Child Rights Act (Amendment Bill) 2014	• Review of records • Interviews with staff and local communities • Record of employees including IDs • Number of cases reported involving abuse of children	Contractor	NEMA, NIB and Supervising Engineer
A15: Labour Influx	Labour Influx	The contractor will prepare the Labour Influx Management Plan as well as the Labour and Recruitment Plan Institution of a "code of conduct for workers". This code of conduct will be signed and followed by all		Contractor	NIB and Supervising Engineer

		workers involved in the project.			
A16: Gender empowerment	Gender empowerment	The contractor will mainstream Gender Inclusivity in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 Gender Rule. Ensuring equitable distribution of employment opportunities between men and women		Contractor	NIB and Supervising Engineer
A17: Increased vehicular traffic	Increase in the likelihood of accidents within and around the vicinity of works area.	A17-1: Inform local communities about the construction programme in advance. A17-2: In case access roads have to be closed, inform local communities and road users in advance.	Written communication to neighbouring communities -Receipts from radio stations for announcements	Contractor	NEMA, NIB and Supervising Engineer
		A17-3: Use reflective signature to direct traffic to designated areas. A17-4: Use flag men to give directions to traffic. A11-5: Install speed reduction humps at crossings of many people, e.g. at a school, market.	-Traffic Management Plan (TMP) in place -Record of vehicular accidents and incidents	Contractor	NEMA, NIB and Supervising Engineer
		A17-6: Sensitize drivers to observe speed limits	Sensitization reports		

A18: Visual amenities	Construction sites, if not well managed, have impacts on aesthetics of the surroundings with the possibility to affect the neighbouring residents.	A18-1. Do not pile excavated soil to form high stockpiles for long durations, A18-2: Clean up the site upon completion of the work.	Cleared and restored site	Contractor	NEMA, NIB and Supervising Engineer
A19: Disturbance and interruption of commercial and social activities	Interference with commercial and social activities	A19-1: Inform local communities about the construction programme in advance. A19-2: In case access roads have to be closed, inform local communities in advance. A19-3: Clean and maintain access roads in the neighbourhood of earth and sand on a daily basis. A19-4: Provide temporary access ways with the approval of local authorities where access roads are closed. A19-5: Carry out work under mild weather (not strong rains or winds). A19-6: Reduce obstruction of access to and use and occupation of roads, footpaths and bridges. A19-7: Protect any items and/or sites of archaeological or cultural value (e.g. private graveyards) discovered during works with the aid of the appropriate authorities.	-Communication to neighbouring communities - Presence of access roads - Refer also to TMP A11-3 to A11-5 - Record of protection and/or compensation of items of cultural values	Contractor	NEMA, NIB and Supervising Engineer

A18: Disruption of social order	Influx of people in the area may affect the local economy, cause alteration of culture and introduce behavioural changes	A18-1: Sensitize all workers to ensure awareness of and sensitivity to the local cultures, traditions and lifestyles, A18-2: Implement the HIV/AIDS impact mitigation plan that will involve providing a comprehensive range of services.	Record of sensitization sessions	Contractor	NEMA, NIB and Supervising Engineer
		A18-3: HIV/AIDS sensitisation, identification of possible HIV/AIDS cases, testing with pre- and post-counselling, the treatment of associated infections, referral of appropriate cases, education to promote better quality of life and promotion of precautions, provision of condoms and the application of HIV occupational exposure policies (this applies to the whole project cycle).	Receipts	Contractor	NEMA, NIB and Supervising Engineer
Loss of Iife, injury and damage to private property	Loss of Iife, injury and damage to private property	• Record of accidents and damages done	• Review of records • Interviews with staff and local community.	Contractor	NEMA, NIB and Supervising Engineer
Operation and Maintenance					
B1: Air pollution	Emissions from generators	B1-1: Same as in construction phase	Logs of maintenance schedules	NIB	NEMA
B2: Noise pollution	Intermittent noise from generators	B2-1: Same as in construction phase,	Logs of maintenance schedules	NIB	NEMA
B3: Solid waste generation	Little amounts of wastes generated during maintenance	B4-1: Same as in construction phase,	SWMP in place and implemented, neat premises	NIB	NEMA
B4: Impacts on flora and fauna	Little or no impact of flora and fauna	B5-1: Same as in construction phase		NIB	NEMA
B5: Occupational health and safety	Exposure of workers to occupational health and	B7-1: Same as in construction phase	Availability of protective wear, e.g. masks, helmets	NIB	NEMA

	safety hazards during repair and maintenance Failure to achieve desired public health associated potable water supply	B7-2: Sensitize local communities about personal hygiene and cleanliness of water sources	etc. Use clean water containers for collecting water and home use		

Table 11-2. Environment and Social Monitoring Indicators

Project Activity/Aspect	Parameter	Indicator	Institutional Responsibility Monitoring Responsibility	Frequency	Project Phase	Monitoring Cost Estimates (KES)
Impact of Flora	Visual Inspection	Bare soil Soil Erosion	Contractor Project Manager/Supervising Engineer	Not possible to monitor on a daily basis. Not possible to monitor on weekly or bi-weekly basis. Construction is completed in 3-5 days' time.	Construction and operation	5,000
Sediment run-off impacting on surface water	Visual Inspection (TSS)	Color of surface water run-off	Contractor Supervising Engineer	Daily (using portable hand held water meter)	Construction and operation	5,000
Air emissions and quality of dust	TPS, SO_2,CO,H_2S,CO_2, Dust fallout	Bad Odour Use of PPE Health and Safety Plan in use Record of induction for workers Active dust suppression	Contractor Supervising Engineer	Daily (using portable hand held air emission meter)	Construction and operation	10,000
Worker and public safety	Visual Inspection Incident and accident records	Induction training Safety working procedure Shoring and appropriate precautions in place	Contractor Supervising Engineer	Daily	Construction and operation	5,000
Occupation Health and Safety	Health and safety records Visual inspection	OHS Management system Active and passive monitoring	Contractor Supervising Engineer	Daily	Construction and operation	5,000

		Excellent workplace safety culture Risk management Interview project staff and management Compliance with SH provisions in CoC Physical inspection Training attendance lists Documentation of fatalities and accidents Number of trainings for staff on SH HR trained in SH Number of fatalities and accidents recorded in the incidence book				
Sexual exploitation and abuse by project workers against community members	Sexual exploitation and abuse by project workers against community members	Code of Conduct Number staff trainings SEA FP Community Liaison Officer trained in PSEA IEC materials for workers sites and community Discrete SEA reporting pathway Review monthly minutes from SEA coordination meetings Interviews with staff and local community.	Contractor Supervising Engineer	Monthly	Construction and operation	15,000
Sexual exploitation and abuse by project workers against community members	Sexual exploitation and abuse by project workers against community members	• Review monthly minutes from SEA coordination meetings	Contractor Supervising Engineer	Monthly	Construction and operation	25,000

		• Interviews with staff and local community • Conduct of conduct • Number of staff trainings • SEA FP • Community Liaison Officer trained in PSEA • IEC materials for workers sites and community • Discrete SEA reporting pathway • Relevant policies, e.g. investigations and discipline and whistle blower protection				
Gender-based violence at the community level	Gender-based violence at the community level	• Training attendance lists • Documentation of SEA cases • Consultations with community members, women and girls • GBV Risk Assessment • GBV Action Plan • Mitigation plan for GBV occurring at the community level as a result of project implementation • Discrete GBV reporting pathway • Number of GBV cases at the community level that	Contractor Supervising Engineer	Monthly	Construction and operation	15,000

		receive survivor-centered referral and care				
Violation of children rights by contractor and labour force on site	Violation of children rights by contractor	• Review of records • Interviews with staff and local community • Record of employees including IDs • Number of cases reported involving abuse of children	Contractor Supervising Engineer	Monthly	Construction and operation	25,000
Storage of hazardous materials and chemicals	Spillages Visual inspection	MSDS for all store Chemicals Functioning storage containers Chemical usage records	Contractor Supervising Engineer	Monthly Audit Review	Construction	25,000
Traffic concerns	Visual inspection	Prepare and implement **Traffic Management Plan** Banks men shall be used to direct vehicle traffic around construction sites and hazards during working hours (Health and Safety Plan). Plan approved by project manager barriers and signage	Contractor Supervising Engineer	Daily	Construction and operation	15,000
Public Awareness and Community perceptions		Grievance management records Evidence of Occurrence-Event report	Contractor Supervising Engineer	Monthly	Construction and operation	5,000
Noise	dB(A)	Measure included in design and procurement plans Hearing protection and	Contractor Supervising Engineer	Daily (using portable hand held noise meter)	Construction and operation	25,000

		PPE in use Record of equipment maintenance				
Soil Erosion	Visual inspection	Bare soil Soil pillars	Contractor Supervising Engineer	Weekly	Construction and operation	15,000
Solid waste management	Domestic refuse, metallic scraps, sludge	Documented Approvals for placement of wastes, Comprehensive waste management plan	Contractor Supervising Engineer	Daily	Construction and operation	15,000

11.8 ESMP IMPLEMENTATION

11.8.1 Project Management Unit

The project implementation arrangements have been established under NIB .The core functions of the team will be to coordinate and facilitate fiduciary oversight (procurement and financial management), environmental and social safeguards supervision, monitoring and evaluation (M&E) and impact evaluation (IE), annual work programming and budgeting, and reporting.

11.8.2 ESMP Implementation

For an effective integration of environmental and social safeguards into the project implementation the Contractor will need to adopt this ESMP and prepare a comprehensive Construction Environment and Social Management Plan (C-ESMP) that will provide the key reference point for compliance. The environmental supervision will also adopt the C-ESMP. ESMP implementation into the project implementation will comprise the following;

Project Supervision Engineer

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

a) Resident Engineer (1No.)
b) Administrator (1No.)
c) Environmentalist Specialist (1No.)

11.8.3 Contractor

The Contractor will ensure that the established safeguards are integrated and implemented throughout the project works as per the C-ESMP. The Contractor will internalize the ESMP/C-ESMP, prepare monthly progress reports and implement instructions issued by the Supervision Consultant. The Contractor will also undertake ESIA Studies for sites outside the project zone and seek appropriate NEMA Licenses. The Contractor, therefore, will engage qualified Environmentalist and Social Experts on full time basis to interpret the C-ESMP and advice on the implementation of the same, as well to the Counterpart Personnel for the Supervision Expert. The full Contractor's Team will comprise of the key staff cadres as specified in the Bidding Document.

The National Environment Management Authority (NEMA) is responsible for ensuring environmental compliance in the country and has an office in Uasin gishu County with staffing who will further ensure that the Sabor irrigation project-ESMP is implemented as part of their mandate, functions and responsibilities. NEMA will undertake surveillance on the project implementation and review compliance performance based on the supervision monitoring reports.

12.0 GRIEVANCE REDRESS MECHANISM

Grievance redressal is a critical component of effective ESMP implementation. The purpose of GRM is to provide a forum to the internal and external stakeholders to voice their concerns, queries and issues with the project. Such a mechanism would provide the stakeholders with one project personnel or one channel through which their queries will be channeled and will ensure timely responses to each query.

This will allow for trust to be built amongst the stakeholders and prevent the culmination of small issues into major community unrest. The GRM will be accessible and understandable for all stakeholders in the project and for the entire project life. The GRM will be communicated to all relevant stakeholders and will also be applicable for any contractor that will occupy and/or use land during the construction and operations phase.

WBG standards require Grievance Mechanisms to provide a structured way of receiving and resolving grievances. Complaints should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities, and is at no cost and without retribution. The mechanism should be appropriate to the scale of impacts and risks presented by a project and beneficial for both the company and stakeholders. The mechanism must not impede access to other judicial or administrative remedies.

This section contains the following:

- Grievance definition and categories and GRM principles;
- The process of receiving, documenting, addressing and closing grievances.

12.1 GRIEVANCE DEFINITION AND CATEGORIES

As stated earlier, a grievance is a concern or complaint raised by an individual or a group within communities affected by company operations. Both concerns and complaints can result from either real or perceived impacts of a company's operations, and may be filed in the same manner and handled with the same procedure.

Grievances may take the form of specific complaints for actual damages or injury, general concerns about project activities, incidents and impacts or perceived impacts. Based on the understanding of the project area and the stakeholders, an indicative list of the types of grievances have been identified for the project, as can be seen below: -

Internal Grievances: Grievances from Employees (including both direct and indirect employees, including local workers and migrant workers through contractors):

- Complaints pertaining to amount of wage, salary, other remuneration or benefits as per Company's Human Resource policy;
- Timely disbursement of remuneration;
- Gender discrimination;
- Sexual harassment
- Sexual exploitation and abuse by project workers against community members
- Violence against children
- Gender-based violence
- Issues related to workers organization.
- Labour Accommodation
- Health and Safety issues
- Extended working hours

External Grievances:

- Issues related to sexual exploitation and abuse
- Issues related to gender-based violence at the community-level
- Issues related to child labour and protection
- Issues related to transportation and traffic;
- Increase in environment pollution;
- Impact on community health;
- Disturbances to locals due to influx of migrant workers in the area;
- Issues arising out of sharing of employment and business opportunity;
- Concerns over the impact on local cultures and customs;

The list of grievances will be regularly updated as and when the new one arises.

12.1.1 INTERNAL GRIEVANCE MECHANISM

The process to be followed for the redressal of the internal stakeholder grievances is summarized below.

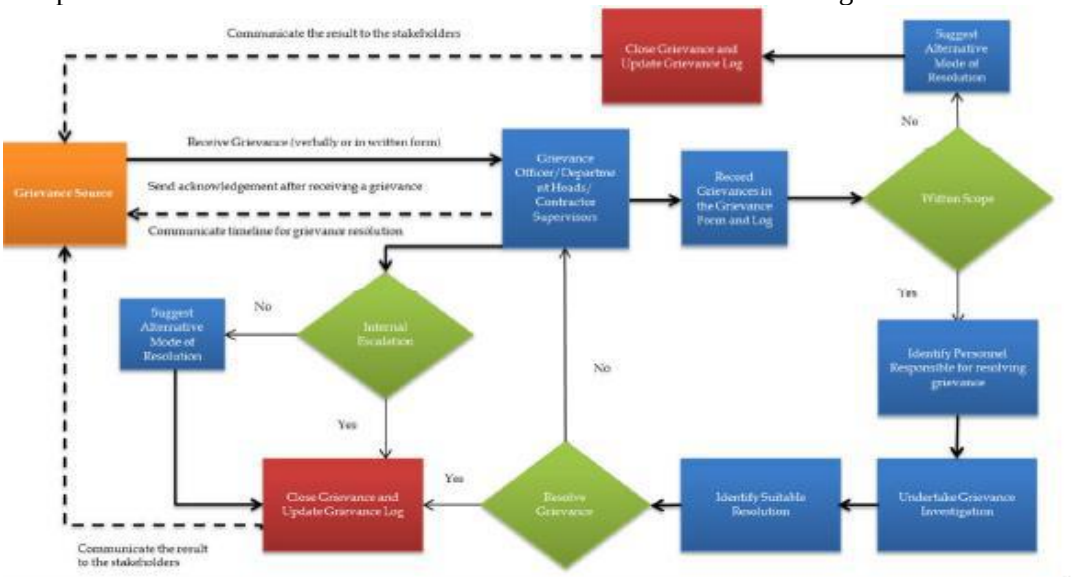


Figure 12-1. Internal Grievance Mechanism

12.1.1.1 Publicizing and Disclosure of the GRM

The GRM will be disclosed to the stakeholders through written and verbal communication. The mediums to be used for this purpose are staff meetings, written communication and one-to-one meetings. Each worker and employee shall be made aware of the GRM in place at the time of joining, as part of the induction process.

12.1.1.2 Receiving and Recording Grievances

As part of the GRM, the grievances from the stakeholders or their representatives may be communicated verbally (in person to the respective supervisor or over a telephonic conversation) or in written form (in the form given below). All grievances communicated in any of these mediums shall be recognized and recorded by the supervisor as and when it is expressed.

Table 12-1. Sample Grievance Recording Form

GRIEVANCE REGISTRATION	
CASE No.	**DATE**

Name	
Department/Contractor Name	
Phone Number	
Details of Grievance	
Name of Person Recording Grievance	
Designation of Person Recording Grievance	
Proposed Date of Response to Grievance	
Signature of Recording Person	Signature of Complainant
GRIEVANCE REDRESSAL RESPONSE	
Date of Redress	
Decision of GO (Give full details)	

The project should also put in place suggestion/ complaint boxes at strategic locations across the facility. These suggestion/complaint boxes will be opened at least every week. The employees and workers may drop their grievances in these boxes as well in keeping with the format attached. In case of any worker or employee needs to file an anonymous complaint, s/he shall be allowed to do so by not filling the Name, department, signature and contact information.

12.1.1.3 Maintaining a Grievance Register

Each grievance thus received, shall be recorded in a grievance register. The format for the grievance register shall be as follows.

Table 12-2. Sample Grievance Recording Form

Date	GR #	Name of Grievant	Ward/Village	Grievance Details	Concerned Department	Name of Recording Person	Present Status	Remarks

This grievance register shall be updated at each stage of the grievance redressal. Once the grievance is recorded in the register, a preliminary analysis shall be undertaken by the grievance officer (preferably HR representative) to ensure that the grievance is within the scope of the GRM.

12.1.1.4 Acknowledgement of Grievance

Once the grievance is received, a grievance number shall be allocated and communicated to the grievant. This communication shall also serve as an acknowledgement of the grievance. In case the grievance is

assessed to be out of the scope of the GRM, a communication towards the same shall be made to the grievant, and an alternative mode of redressal shall be suggested.

As part of this acknowledgement a tentative timeline for the redressal of the grievances shall be identified, in keeping with the process below. This acknowledgement shall be provided on the same day as the grievance is received.

12.1.1.5 Resolution and Closure Allocation of Responsibility

Once the grievance is received and recorded, based on the subject and issue, the Grievance Officer shall identify the department, contractor or personnel responsible for resolving the grievance.

The Grievance Officer and concerned department shall then undertake an enquiry into the facts and figures relating to the grievance. This shall be aimed at establishing and analyzing the cause of the grievance and subsequently identifying suitable mitigation measures for the same. The analysis of the cause will involve studying various aspects of the grievance such as the employees past history, frequency of the occurrence, management practices, etc.

As part of this investigation, the grievance officer may also undertake confidential discussions with the concerned parties to develop a more detailed understanding of the issue at hand. The site investigation shall be completed in no more than 10 working days of receiving the grievance. Resolution, Escalation and Closure Based on the understanding thus developed, the grievance officer, in consultation with the concerned departments, shall identify a suitable resolution to the issue.

This resolution shall be accordingly communicated to the grievant within 10 working days of completing the site investigation. In case the issue is beyond the purview of the grievance officer, it should be escalated to the department head or Owner's Engineer (as appropriate).

A communication regarding the same shall be provided to the grievant. The Contractors' RE shall in turn endeavor to resolve the grievance within 10 working days of the escalation.

The Contractors' RE shall endeavor to resolve the grievance within 10 working days. If, however the Contractors' RE is not able to identify an adequate resolution for the grievance, then an adequate response shall be given to the grievant along with a suggested alternative resolution to the grievance. If at any stage, the grievant is not satisfied with the solution, s/he may choose to ask for an escalation of the grievance to the next level.

12.1.1.6 Update of Records

The records of the grievance register shall be updated every working week with the present status of the grievance. Once the grievance is resolved, and the same has been communicated to the grievant, the grievance shall be closed in the grievance register. The grievance register should also provide an understanding of the manner in which the grievance was resolved. These instances shall then serve as references for any future grievances of similar nature. In case of anonymous complaints, a summary of the grievance and resolution shall be posted on the notice boards and other relevant public places.

12.1.2 EXTERNAL GRIEVANCE MECHANISM

The process to be followed for the redressal of the external stakeholder grievances is summarized below.

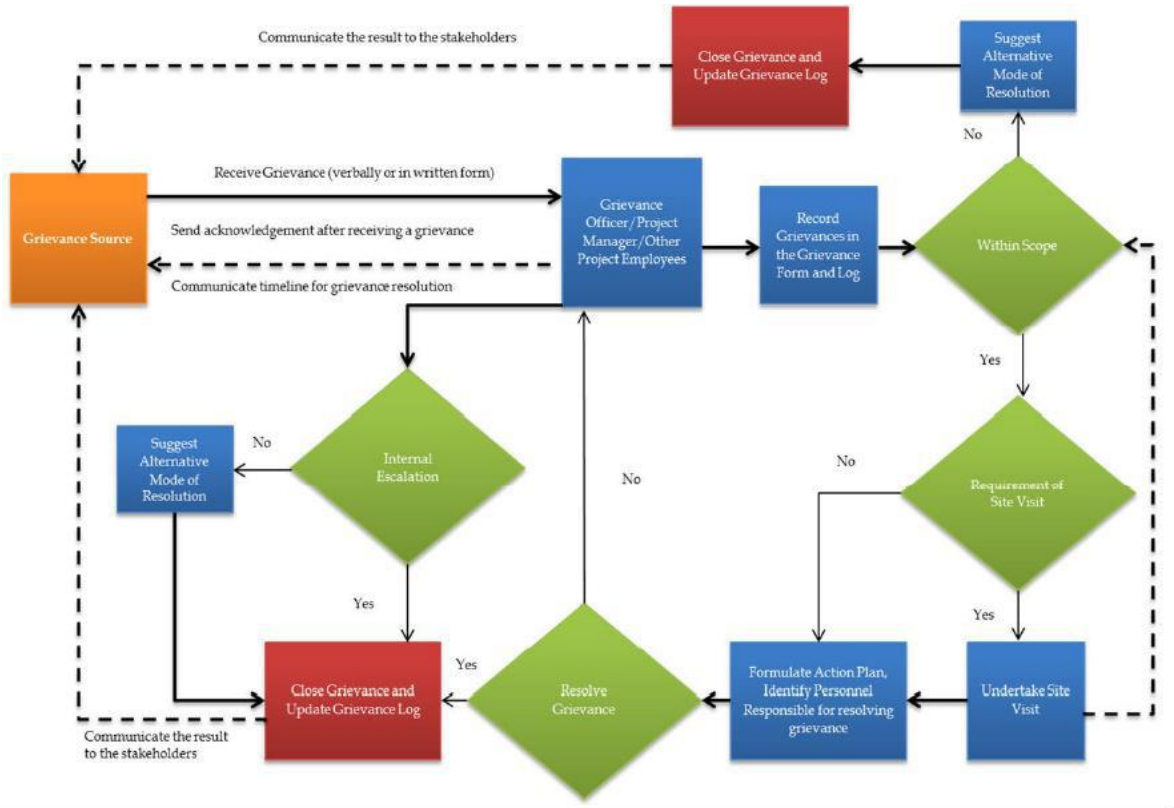


Figure 12-2. External Grievance Mechanism

12.1.2.1 Publicizing and Disclosure of the GRM

The GRM will be disclosed to the stakeholders through written and verbal communication. The mediums to be used for this purpose are public meetings, group discussions, and provisioning of the GRM in the manner outlined in the previous section. The GRM disclosure will be done along with the disclosure of other management plans.

12.1.2.2 Receiving and Recording Grievances

As part of the GRM, the grievances from the stakeholder or their representatives may be communicated verbally (in person or over a telephonic conversation) or in written form (in the format given below) to the project representatives or to the GO directly. If the grievance is received directly by the GO or other project representatives, it will be recorded directly into the Grievance Form as soon as the personnel return to site. A sample grievance form is as follows.

Table 12-3.Sample Grievance Recording Form

GRIEVANCE REGISTRATION	
CASE No.	**DATE**
Name	
Department/Contractor Name	
Phone Number	
Details of Grievance	
Name of Person Recording Grievance	

Designation of Person Recording Grievance	
Proposed Date of Response to Grievance	
Signature of Recording Person	Signature of Complainant
GRIEVANCE REDRESSAL RESPONSE	
Date of Redress	
Decision of GO (Give full details)	

All project staff will be informed that they must pass all grievances, communications to the Grievance Officer (discussed in the following section) on site as soon as possible after they are received. Details of the person lodging the grievance shall be noted and passed along with the grievance. The Grievance Officer in turn will communicate all grievances to the Environmental and Social Officers for the contractor or PMU. For assisting the communication of grievances, a register will be maintained at the project office and camp, at which any individual/group can come have their complaint registered. Village leaders and government departments will also be advised to pass any complaints they receive to the site level community liaison officers.

12.1.2.3 Maintaining a Grievance Register

Each grievance thus received, shall be recorded in a grievance register. The format for the grievance register shall be as follows.

This grievance register shall be updated at each stage of the grievance redressal. Once the grievance is recorded in the register, a preliminary analysis shall be undertaken by the social officer to ensure that the grievance is within the scope of the GRM.

12.1.2.4 Acknowledgment of Grievance

Upon the completion of the recording of the grievance, the stakeholder will be provided with an acknowledgment of the receipt, along with a summary of the grievance.

Box 12.1 Sample Acknowledgement Receipt for Claimant

This receipt is acknowledgement of grievance registration by _____,resident of village _____ on date _____ His case number is _____ and the date for response is _____

Full name & signature of recording person_____

In case the grievance is assessed to be out of the scope of the GRM, a communication towards the same shall be made to the grievant, and an alternative mode of redressal shall be suggested.

12.1.2.5 Site Inspection and Resolution

For the purpose of verifying and resolving the grievances received, site inspection may not be required in all the cases. Depending upon the sensitivity of the issue, requirement of a site inspection will be identified.

A site inspection will be undertaken by the site level community liaison officers or the project member assigned by the contractor's Environment and Social officer. The purpose of the site inspection will be to check the validity and severity of the grievance.

For this purpose, the personnel may also undertake discussions with the concerned external stakeholder. The inspection will be undertaken within ten days of receiving the grievance. The assigned individual will then work with other relevant members of the Project team to investigate the problem and identify measures to resolve the grievance as appropriate. The personnel to be involved in the grievance resolution shall be dependent upon the nature of the grievance.

12.1.2.6 Resolution, Escalation, and Closure

Based on the understanding thus developed, the social manager, in consultation with the concerned departments, shall identify a suitable resolution to the issue. This could involve provision of information to clarify the situation, undertaking measures to remedy actual problems or compensate for any damage that has been caused either by financial compensation or compensation in-kind, and introduction of mitigation measures to prevent recurrence of the problem in the future. This resolution shall be accordingly communicated to the grievant within 10 working days of completing the site investigation.

12.1.2.7 Update of Records

The records of the grievance register shall be updated every working week with the present status of the grievance. Once the grievance is resolved, and the same has been communicated to the grievant, the grievance shall be closed in the grievance register.

The grievance register should also provide an understanding of the manner in which the grievance was resolved. These instances shall then serve as references for any future grievances of similar nature.

12.1.3 MONITORING OF THE GRM IMPLEMENTATION

It is important to monitor GRM to ensure that the grievances are addressed and resolved. The monitoring of the GRM implementation will be undertaken on a monthly basis by the NIM project management team. Monitoring will include:

- Auditing the implementation of the GRM;
- Monitoring the formal and informal consultation activities conducted with the stakeholder groups with respect to GRM;
- Tracking feedback received from engagement activities
- Recording and tracking commitments made to communities; and
- Assessing the efficacy of the engagement activities in terms of the desired outcomes and the participation of the stakeholder groups

12.1.4 REPORTING OF THE GRM

The performance of the GRM will be reviewed on a quarterly basis during the implementation period. For the purpose of review, the quarterly reports will be considered for analysis and discussion. On the basis of these reports, a Grievance Redressal Report will be prepared.

13.0 SUMMARY AND RECOMENDATIONS

13.1 SUMMARY

There is potential for negative and positive impacts from the Project. Most of the negative impacts can be reduced or eliminated by mitigation. Table 60 summaries the potential impacts which might occur during construction and operation and the residual risk or level of impact after mitigation.

The ultimate goal of this ESIA study was to identify impacts resulting from the proposed project that were determined on the basis of the baseline conditions to be established during the field work and information obtained from the documents reviewed. The environmental and social impact assessment study process was designed to provide a view of the environmental and social status and establishment of the diversity on physical environment, social and ecological status in the area.

Most of the potential negative impacts are confined to the construction phase. Direct impacts from construction on the physical and socio-economic environment including health and safety and gender issues can be reduced or eliminated, principally by measures taken be the works contractors in compliance with World Bank safeguards policies, extant Kenyan laws and regulations and International Federation of Consulting Engineers (FIDIC) standard contract provisions but also other measures separate from the construction contract. Physical impacts on property and losses to business can be mitigated and compensated through the RAP processes.

The major benefit of the project will be during the operational phase from expanded access to, and improved reliability of, irrigation water supply Lower Sabor region of Uasin Gishu county which will crop productivity, food security , household income and better living standards. Implementation of the project will result in economic gains at both the micro and macro levels.

The following conclusions have been arrived at regarding the proposed project. The anticipated benefits of the construction and operation and maintenance of the Project are immense. For the project components, which are suggested to be maintained and those where alternatives were provided, an evaluation of the positive and negative impacts was performed, and an Environmental Monitoring Plan (EMP) drawn. All negative impacts can be mitigated following the ESMP.

The negative impacts identified in this ESIA during the planning, construction, operation and decommissioning phase of the project, including waste generation, air pollution, noise pollution, occupational health and safety impacts, community health and safety impacts, traffic, labour influx and gender impacts will be limited to the pipeline wayleaves and can be mitigated using the measures proposed in the ESMP as well as the preparation and implementation of C-ESMPs including but not limited to:-

- ✓ *Health, Hygiene and Safety Plan*
- ✓ *Labour Management Plan*
- ✓ *Child Protection Strategy*
- ✓ *Waste Management Plan*
- ✓ *Contractors Code of Conduct, specific provisions for VAC, SEA and SH*
- ✓ *Gender Inclusivity Strategy*
- ✓ *HIV/Aid Prevention Strategy*
- ✓ *GBV Action Plan, including:*
    - ✓ *SEA Prevention and Response Strategy*
    - ✓ *SH Policy*
    - ✓ *GBV (at the community level) Mitigation Plan*
    - ✓ *SEA Redress Mechanism*

- ✓ *SH Redress Mechanism*

Other plans to aid the implementation of the safe project implementation will be included as the project continues. The adverse impacts on the physical and natural environment will be "in sum total," not significant, and can be handled through the provided mitigation measures. There are incremental costs required to achieve these. The contractor will be legally bound to implement this ESMP and any subsequent C-ESMP that will be developed during the construction process. This obligation will be explicitly stated in the ToR, bidding documents and the final executed contract. Based on the immense project benefits of the water supplies rehabilitation and expansion Project, which have been stated above, and the identified negative impacts which can be mitigated in the proposed ESMP, we strongly contend that NEMA will find this ESIA study satisfactory and the project environmentally and socially viable to be permitted to take off. \

14.0 APPENDIX

14.1 APPENDIX 1-PUBLIC CONSULTATION LIST OF PARTICIPANTS

-see separate attachment-

14.2 APPENDIX 2-CHANCE FIND PROCEDURES

Chance find procedures are an integral part of the project ESMMP and civil works contracts. The following is proposed in this regard:

If the Contractor discovers archeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction, the Contractor shall:

- Stop the construction activities in the area of the chance find;
- Delineate the discovered site or area;

Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the Ministry of State for National Heritage and Culture take over;

Notify the supervisor, Project Environmental Officer and Project Engineer who in turn will notify the responsible local authorities and the Ministry of State for National Heritage and Culture immediately (within 24 hours or less);

Responsible local authorities and the Ministry of State for National Heritage and Culture would then be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archaeologists of the National Museums of Kenya. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage, namely the aesthetic, historic, scientific or research, social and economic values.

Decisions on how to handle the find shall be taken by the responsible authorities and the Ministry of State for National Heritage and Culture. This could include changes in the layout (such as when finding irremovable remains of cultural or archeological importance) conservation, preservation, restoration and salvage.

Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities.

Construction work may resume only after permission is given from the responsible local authorities or the Ministry of State for National Heritage and Culture concerning safeguard of the heritage.

14.3 APPENDIX 4-SELECTED MAPS

-see separate attachment-

14.4 APPENDIX 5-DESIGN REPORT AND DRAWING

14.5 APPENDIX 6-HYDRALOGICAL STUDY REPORT

14.6 APPENDIX 4-SELECTED PICTURES