



NORTHERN COLLECTOR TUNNEL (NCT) LAST MILE PROJECT – LOT 2

ENVIRONMENTAL IMPACT ASSESSMENT (ESIA) SUMMARY PROJECT REPORT FOR THE PROPOSED MLOLONGO, SYOKIMAU & KATANI WATER SUPPLY PROJECT

October 2025



in Joint
Venture
with



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GENERAL INFORMATION

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CONTRACT NO	AWWDA/AFD/NWSP/CS/01/2020
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DISCLAIMER:

This Summary Project Report is based on literature review and findings from field assessment. It is however, subject to conditions in the Environmental Management and Coordination (Amendment) Act, 2015, Environmental Impact Assessment and Audit Regulations, 2019 and World Bank Environmental and Social Framework.

FACT SHEET

Program Name	Construction Works For Northern Collector Tunnel (Nct) Last Mile Water Supply Works –Lot 2
Assignment Name	Proposed Mlolongo, Syokimau & Katani Water Supply Project
Report Name	Summary Project Report
Lead Implementing Agency	Athi Water Works Development Agency (AWWDA)
Financier	Agence Française de Développement
Project Components	- Laying of 45Km of OD160 - 63 distribution lines in Syokimau, Mlolongo, Katani and surrounding environs to enable water supply. - Laying Diameter (OD) Length (m) 315 mm 2,280 at JKIA - Laying Pipe Diameter (OD) Length (m) 160 mm 1,074.00 and 110 mm 617.00 at Embakasi KDF.
Project Location	Katani location, Mavoko Constituency in Machakos County.
Target Beneficiaries	Residents of Syokimau, Mlolongo, Katani, Embakasi Garrison, JKIA and their surrounding environs
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ABBREVIATIONS

AIDs	Acquired immunodeficiency syndrome
AWWDA	Athi Water Works Development Agency
CESMP	Construction Environment & Social Management Plan
COC	Code of Conduct
EMCA	Environmental Management & Coordination Act
EHS	Environment Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Management and Monitoring Plan
GBV	Gender Based Violence
HIV	human immunodeficiency virus
JKI	Jomo Kenyatta International Airport
KMC	Kenya Meat Commissioner
LRP	Livelihood Restoration Plan
MAVWASCO	Machakos Water and Sanitation Company
NCT	Northern Collector Tunnel
NEMA	National Environment Management Authority
NEP	National Environment
OSHA	Occupational Health and Safety
PPEs	Personal Protective Equipment
RAP	Resettlement Action Plan
SEA	Sexual Exploitation and Abuse
SGR	Standard Gauge Railway
SPR	Summary Project Report
STI	Sexually Transmitted Infections
VCT	Voluntary counseling and testing
WIBA	Workplace Injuries and Benefits Act

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EXECUTIVE SUMMARY

E.1 Project Background

The Northern Collector Tunnel is part of the Nairobi Water Master Plan, which aims to improve water access to residents of Nairobi and 13 Satellite Towns Namely Kikuyu, Ruiru-Juja, Kiambu, Karuri, Githunguri, Mavoko Municipality, Ngong Township, Ongata Rongai, Thika, Gatundu, Limuru, Lari and Tala-Kangundo. Under the Nairobi Water and Sanitation Project (NWSP) financed by the Agence Française de Développement (AFD) and the Government of Kenya, Athi Water Works Development Agency (AWWDA), intends to implement last-mile works for the Northern Collector Tunnel. They involve expanding and upgrading local distribution networks to deliver reliable water to households, institutions, and businesses in underserved and rapidly growing areas.

The proposed works are located within several key urban and peri-urban areas of Nairobi, Kajiado and Kiambu Counties, specifically Embakasi KDF Camp, Syokimau, Mlolongo, Thindigua, Lioki, and Fourways. These areas have been prioritized due to their rapidly growing populations and existing water service gaps.

This ESIA is for the proposed works in Syokimau, Mlolongo, Katani and environs

The main objective of this proposed Project is;

- a) To increase daily clean water supply
- b) To meet the growing water demand in the region and reduce previous supply deficits.
- c) To improve water supply, increase coverage, and reduce the burden of water collection for many residents.

The scope of services to be provided by the Consultant include the following:

- Syokimau–Airport Road – 4.0 km total
 - 1.0 km DN 160 mm HDPE pipeline
 - 3.0 km DN 110 mm HDPE pipeline
- Chady Road Mains – 1.2 km total
 - 0.6 km DN 160 mm HDPE pipeline
 - 0.6 km DN 90 mm HDPE pipeline
- Mwananchi Road Mains – 3.5 km total
 - 2.0 km DN 160 mm HDPE pipeline
 - 1.5 km DN 110 mm HDPE pipeline
- Kiungani Road – 4.5 km total
 - 2.5 km DN 160 mm HDPE pipeline
 - 2.0 km DN 110 mm HDPE pipeline
- Community Road Mains – 4.7 km total
 - 2.2 km DN 160 mm HDPE pipeline
 - 2.5 km DN 110 mm HDPE pipeline
- Katani Road Water Mains – 4.2 km total
 - 4.2 km DN 160 mm HDPE pipeline
- Parliament Road – 3.9 km total
 - 0.6 km DN 160 mm HDPE pipeline
 - 3.3 km DN 90 mm HDPE pipeline

- Quarry Road Mains – 4.0 km total
 - 4.0 km DN 160 mm HDPE pipeline
- Katani Estate Main Pipeline Supply – 5.5 km total
 - 5.5 km DN 160 mm HDPE pipeline
- Katani Road Offtake 1 – 3.0 km total
 - 3.0 km DN 110 mm HDPE pipeline
- Katani Estate Offtake 2 – 2.0 km total
 - 2.0 km DN 90 mm HDPE pipeline
- Katani Road Offtake 3 – 3.0 km total
 - 3.0 km DN 110 mm HDPE pipeline
- 0.9 km DN 200 mm Epoxy Steel Pipeline Laying of 45Km of OD160 - 63 distribution lines in Syokimau, Mlolongo, Katani and surrounding environs to enable water supply.
- JKIA Water- Pipe Diameter (OD) Length (m) 315 mm 2,280
- Embakasi KDF. Line - Pipe Diameter (OD) Length (m) 160 mm 1,074.00 and 110 mm 617.00
- Mlolongo Missing Link – 0.9 km total

E.2 Project objectives

The main objective of this proposed project is:

- a) To increase daily clean water supply
- b) To meet the growing water demand in the region and reduce previous supply deficits.
- c) To improve water supply, increase coverage, and reduce the burden of water collection for many residents.

E.3 ESIA Objectives

The objectives of the assessment were:

- i. To present existing environmental, social and cultural setting of the target project area
- ii. To identify potential environmental and social impacts (direct and indirect), including opportunities for enhancement; this includes the cumulative impact of the proposed project and other developments which are anticipated;
- iii. To generate feasible alternative investments, sites, technologies, and designs,
- iv. To provide preventive, mitigating, and compensatory measures
- v. To prepare grievance redress mechanism plan
- vi. To provide detailed results of the public consultation and
- vii. To prepare an Environmental and Social Management and monitoring Plan to mitigate the identified impacts so as to ensure sustainability of the proposed projects.
- viii. To recommend cost effective measures to be implemented to mitigate against the expected impacts

E.4 ESIA Methodology

The ESIA was carried out in line with the provisions of the Environmental Management and Coordination 2015 and the Environmental (Impact Assessment and Audit) Regulations 2003 emended in 2019. An Environmental and Social Management Plan comprising of an impact mitigation plan and modalities for monitoring and evaluation were then developed to guide environmental management during all phases of project development. Specific tasks undertaken during the assessment include:

Task 1: Desk review of available literature

Task 2: Stakeholder consultation through holding public barazas and one-on-one interviews with the area residents and key informant's stakeholders within the project area

Task 3: Identification of relevant government institutions and their responsibility in ensuring that the project is implemented within the current institutional framework including review of relevant legal and policy issues relevant to the Environmental and Social Safeguard Requirement by AFD and Government of Kenya.

Task 4: The task involved identification, collection and analysis of environmental baseline data, identification of impacts; analyses and evaluation of impacts; formulation of mitigation measures for significant negative impacts; development and analysis of project alternatives, and development of environmental/social management and monitoring plans.

E.5 Policy, Legal and Administrative Framework

The main legislation that governs environmental management in Kenya is the Environmental Management & Coordination (Amended) Act of 2015 typically referred to as EMCA. EMCA calls for environmental impact assessment (EIA) (under Section 58) to guide the implementation of environmentally sound decisions and empowers stakeholders to participate in sustainable management of the natural resources. Part V from Sections 42 – 57 deals with Protection and Conservation of the Environment while Part VI deals with Integrated Environmental Impact Assessment. Projects likely to cause environmental impacts require that an environmental and social impact assessment study to be carried out. It is under this provision that the current study has been undertaken because Legal Notice No. 32 and 34 of April 19, 2019 places the proposed interventions under the Medium-Risk Category requiring the preparation of a summary project report.

The other relevant legislation applied during this assessment are the regulations borne of EMCA Cap 387 namely the Environmental Impact Assessment and Audit Regulations (Amendment) 2019, the Environmental Management and Co-ordination (Water Quality) Regulations 2006, the Environmental Management Co-ordination Act (Wetlands, River Banks, Lake Shore and Sea Shore Management) Regulations 2009; the Environmental Management Coordination (Noise and Excessive Vibration Pollution Control) Regulations 2009; and the Environmental Management and Co-ordination (Conservation of Biological Diversity Resource Access to Genetic Resource and Benefit Sharing I) Regulations 2006, (Legal Notice 61), Kenya Airports Authority (KAA) Act (Cap 395), Civil Aviation Act (No. 21 of 2013), Protected Areas Act (Cap 204), Air quality Regulations 2013, ABS Regulations and the Controlled Substances Regulations 2025, among others.

The other sectorial legislation applicable to this project includes the Constitution of Kenya 2010, Constitution of Kenya 2010, Kenya Vision 2030, National Environment Policy (NEP) 2013, National Climate Change Response Strategy, 2010, The National Environment Policy, 2013, Kenya National Youth Policy 2006, The National Environmental Sanitation and Hygiene Policy-July 2007, The Physical and Land Use Planning Act, 2019, Land Act, 2012, Water Act, 2016, Water Rules 2007, County Government Act No. 17 of 2012, Occupational Health and Safety Act (OSHA 2007), The Public Health Act (CAP.242), Employment Act, HIV and AIDS Prevention and Control Act 2011, Sexual Offences Act 2006, Child Rights Act (Amendment Bill) 2014, Work Injury Benefits Act (WIBA), Labor Relations Act 2012, National Gender and Equality Commission Act 2011, Water (Harvesting and Storage) Regulations, Public Participation Bill of 2016.

E.6 Highlights of Stakeholder Consultations

Environmental Impact Assessment / Audit Regulations 2019 require that in the process of conducting Scoping, Environmental Impact Assessment, the proponent shall in consultation with the Authority herein referred to as the National Environment Management Authority (NEMA); seek the views of persons who may be affected by the project.

Therefore, to comply with the above discussed statutes, key stakeholder's consultations were conducted using a standard questionnaire (Annex 5) at the stakeholder's preferred venues. . In total 11 interviews with key stakeholders were conducted. This constituted 9 males and 2 female key stakeholders The list of key informants consulted included is presented in Table E-6A.

Table E-6A: List of Key Informants Consulted

Name	Gender	Designation
James Gitonga	Male	Administration Syokimau County Government
Mohamed Ismai	Male	Syokimau Residents Association Chairman
Philip Mango	Male	Ass. Syokimau Residents Association
David K. Muthuka	Male	Ass. Chief Syokimau Area
Shem N. Olumula	Male	Syokimau Youths Association
Denis Munene	Male	Operations Manager MAVWASCO
Jane Mbithi	Female	Chief Katani Area
Jacky	Female	Machakos County Department of Water, Irrigation, Environment Climate Change & Natural Resources
Sally Sammy	Male	
William Makau	Male	
Nancy Ndegwa	Female	Assistant County Commissioner
Major	Male	Embakasi Major Garrison Administrative officer
Eng. Meshack Ochieng	Male	GM - PES

In addition, 3 public barazas were held, to sensitize the members of the public about the proposed project as well as get their views regarding the proposed interventions. Further, consultations were undertaken using standard questionnaires. Minutes of the meetings and filled-in questionnaires are annexed (Annex 3 and Annex 5).

table E 6B below presents a schedule of meetings held with dates venues, location and no of participants that were present in each meeting.

Table E-6B: Detail of Public barazas held

No	Date	Venue	Location	No of participants		Total
				Male	Female	
1.	1.10.2025	Chief's office ground	Syokimau	39	8	47
2.	2.10.2025	Orynx Petrol Station-Katani	Katani	20	8	28
3.	24/10/2025	Mlolongo Chiefs Camp	Mlolongo	36	13	49
			Total	95	29	124

E.7 Project Impacts

Assessment of project Impacts was based on analysis of the proposed project components and existing environmental conditions. The impacts arising during each of the phases of the proposed development namely construction, operation and decommissioning, can be categorized into:

- Impacts on biophysical environment;
- Health and safety impacts; and
- Social-economic impacts

Sections E-7.1 to E-7.4 below provides a summary of the project impacts both positive and negative discussed in this Report.

E-7.1 Positive Impacts

The project is envisaged to have positive impacts after completion of the civil works and commissioning. A summary of anticipated positive impacts of the Project include:

- **Employment opportunities**- The Project shall create job opportunities for both skilled and unskilled workers such as casual labourers, plumbers, operators, electricians, welders and engineers who shall be engaged on-site for a specific duration. The workers are expected to gain skills and knowledge that they will use after the completion of the project to earn a living. The income gained from the job opportunities will improve the residents' standards of living.
- **Improving growth of the economy**-Through the use of locally available materials during the construction phase of the project including cement, concrete, timber, sand, ballast pipes etc., the project will contribute towards growth of the economy by contributing to the gross domestic product. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the government hence increasing government revenue while the cost of these raw materials will be payable directly to the producers. Further Living standards and livelihoods of the local people will be improved through, provision of job opportunities, provision of market for supply of building materials such as cement; and pipes, access to clean and safe water among others. In addition, the informal sector will grow due to emerge of secondary business which come up during the construction periods of such projects. These include activities such as food vending who benefit directly from the construction staff members who buy food and other commodities from them
- **Technology transfer** -The project will be associated with technological and knowledge transfer to the local sector, this will be through the artisan who will be employed and trained by the project.
- **Creation of wealth**-The proposed development brings many opportunities in investment and procurement where the youth and people from Mlolongo, Syokimau & Katani area can compete to provide different goods and services to the proponent during construction of the reticulation sewers.
- **Injection of money into the local economy**-A large sum of the project money shall be released into the local economy due to the construction activities.
- **Creation of a market for construction materials**-The project will require materials, some of which will be sourced locally and some internationally. These include plastic pipes, valves, cement, sand, hardcore and chemicals
- **Improved well-being of women and children**: Water accessibility at homesteads would translate to time saving by the women. Time saved thus would be invested in other engagements that could bring financial benefits to the family. Children also bear the brunt of water borne diseases while women are tied down to provide nursing care to the sick family members.
- **Improved accessibility to clean and reliable water supply**-The proposed water distribution network is intended to improve water supply to area Residents of from Mlolongo, Syokimau &

Katani area in Machakos County as well as at the JKIA airport and at Embakasi KDF. This will reduce the water shortage experienced in the area and within the 2 institutions.

- **Improved revenue for MAVWASCO water and Sewerage Company**-Improved revenue to **MAVWASCO** from increased customer base as the proposed project will increase the number of residents being served by the water companies. It will also make the supply reliable thus increasing the revenue base. Further, this will improve sustainability of the company.

E-7.4 Negative Impacts and Recommended Mitigation Measures

Associate d Impacts	Management Actions
Environmental Impacts	
Noise and vibration	• Prior communication to the school board and management before constructions work should be made especially where construction activities will be taking place along the schools as presented under sensitive receptors • Early notifications should be made to institutions and businesses (listed in Error! Reference source not found.) prior the commencement of works within their area. This is to inform them they may experience some disruptions for few days during construction. Notification is a form of courtesy and will reduce conflicts and disagreements between the community and the project team. • Construction noise should not exceed 60 dB (A) during the day as per the Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. • Machinery, vehicles and instruments that emit high levels of noise shall be used at intervals and the workers shall work interchangeably to reduce the overall impact and exposure time. These pieces of equipment such as concrete vibrator, compressors, plate compactors and cement mixers etc (listed in Table 7-1) should also be used when the least number of residents can be expected to be affected, for example during periods where most residents are at work, school, weekends or holidays • Establish channels for feedback and addressing of concerns raised by stakeholders promptly. • Conduct quarterly assessments of noise levels to ensure they remain within acceptable limits. These assessments shall be done by an external health and safety expert. • Provision of appropriate personnel protective equipment to the workers such as ear muffs and plugs. • Conducting medical examinations(audiometry) by a Designated Health Practitioner for workers exposed to prolonged high noise levels
Dust Emission	• Regularly dust suppression through watering should be done on exposed surfaces, particularly during dry conditions. • Strict protocols should be enforced for handling construction materials in powder form, such as covering

Associate d Impacts	Management Actions
	of cement and sand during transportation. • Provision of PPE e.g. dust masks to workers. • Reinstatement of disturbed areas once construction is completed. • Minimizing the number of motorized vehicles in use on site. • Conducting workers medical examinations (Pulmonary Function Test (PFT) or Spirometry) by a Designated Health Practitioner for especially for workers exposed to cement and dust.
Soil Pollution	• A portable impermeable surface such as concrete platform should be used to prevent concrete spillage onto soil during concrete works done within the project site. • In case of spilled cement or concrete should be collected and disposed by the licensed waste handler to a NEMA waste collection site. • During cement mixing, water management should be key to reduce runoff and unnecessary water wastages. • Use of water sprays or dust suppression equipment around cement mixing areas will minimize airborne particles that could settle on soil causing pollution
Solid waste generation and wastewater managem ent	• All solid waste will be collected at a central location designated by the Contractor preferably at the campsite and on project site, using clearly labelled and color-coded containers. It will be stored temporarily until it is moved to a NEMA-approved disposal site, handled by a licensed waste collector as per the Waste Management Regulations 2006. • Wherever possible, the Contractor should reuse and recycle waste generated on site. • All personnel assigned to collect waste on site shall be provided with appropriate PPEs i.e. heavy-duty gloves, protective footwear, dust masks and aprons. • A comprehensive site waste management plan shall be prepared by the Contractor prior to commencement of construction works. This should include designation of appropriate waste storage and segregation areas, collection and removal schedule and identification of approved disposal site by NEMA. • The Contractor shall ensure workers are sensitized on proper waste management methods on site during construction. • Construction of standards septic tank and timely exhaustion of waste when it is full to avoid spill offs
Site Related Oil Spills	• The Contractor should ensure that the employees on site are aware of the procedures for dealing with spills and leaks through induction, toolbox talks and safety trainings (the Contractor's EHSS shall propose a method of clean-up which shall be subject to approval); • All vehicles and equipment should be kept in good working conditions and serviced regularly in service

Associate d Impacts	Management Actions
	stations and fueling stations selected by the Contractor • The Contractor to ensure spill kits are provided at the construction sites for machines like generators promoting efficient response to spills, minimizing environmental impact and ensuring workers' safety. • Ensure fuels, oils, and lubricants are clearly labelled and stored in impermeable containers away from surface drains.
Impacts on vegetation	• Reinstatement of the project sites after completion of works • The Contractor to adhere to the delineated construction work area. • Planting of grass and trees in sites identified within the project area preferably schools, institutions where they can be secure and well maintained. • Environmental Audits
• Occupational Safety and Health Impacts	
Workers and communit y welfare	• Conducting worker's pre-employment and periodic medical examinations by a Designated Health Practitioner. This will include general medical examinations, specialized tests depending on the worker's job description such as Pulmonary Function Test (PFT) or Spirometry for workers exposed to cement and dust, audiometry amongst others as prescribed in the OSHA ACT 2007, Medical Examination Rules, 2005 and Legal Notice No. 50 of 2022 • Provision of Labelled toilet facilities at a minimum ratio of Toilet per 30 workers (preferred 1:15) and the exact location of the toilets shall be approved by the Public Health Department prior to establishment. • The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from site to an approved disposal site. • Provision of adequate clean drinking water and drinking vessels should be made available on site. • Provision of adequate resting areas and gender segregated changing station away from machinery for the workers to be accessed during breaks. • Clearly post warning signs indicating the presence of construction activities and potential hazards and communicate construction plans and potential noise impacts to the community prior to construction. This helps reduce conflicts with the community and helps residents plan for their day-to-day activities. • Community members should be notified before work commences for them to be aware of the ongoing works and take precautions.
Accidents, injuries and loss of life,	• Develop a site Occupational safety action plan detailing safety equipment to be used, emergency procedures, restriction on site, frequency and personnel responsible for safety inspections and controls adhering to guidelines in the OSHA Act 2007

Associate d Impacts	Management Actions
	• Developing a health and safety policy to be adhered to by all the project team members • Conducting Job Safety Analysis and risk assessments before commencing works on new sites. • Conducting machinery and vehicles inspection on site by a licensed inspector • All workers should be provided with appropriate PPEs (Overalls, Reflectors, Helmets, dust masks, Steel toe Gum boots and safety shoes, Heavy duty gloves, Goggles for eye protection) to prevent and minimize accidents and injuries. Appropriate PPEs should be provided as established from risk assessment and enforce their usage. • The workers should receive requisite training especially on the operation of the machinery and equipment from licensed NTSA trainers • Trainings for the workers during induction and toolbox talks on Occupational Health and Safety, first aid and fire safety. • Ensuring that the prepared code of conduct for staff is signed and adhered to • The Contractor shall provide safe means of transportation for workers transported to site daily. • Trenches should be well secured using warning tape, hard barricades and with appropriate, visible signages. • Access ladders shall be provided to facilitate movement in and out of the trenches and during masonry works. • Sensitization shall be done to all workers on safe transportation of materials and penalties for not adhering shall be communicated through inductions and toolbox talks. • Provide fully equipped First Aid Kits within the construction sites and ensure that at any moment during the works, there is a trained first aider on site. The ration of trained first aiders to worker will be as per defined by the OSHA First Aid Rules. • Recording of all accidents, injuries and deaths that occur on site in the incident register, corrective actions for their prevention and investigated as appropriate. • Contractor should have an up-to-date Work Injury Benefit Act (WIBA) and the Contractors All risk plan and maintain insurance cover that covers all workers throughout the construction period. • The Contractor to have an agreement with local health facilities for the provision of emergency services • Community members should be notified before work commences for them to be aware of the ongoing works and trained on the safety measures to be followed. • Proper maintenance of tools and machineries highlighted in Table 7-1
Fire	• Label all inflammable materials and store them appropriately

Associate d Impacts	Management Actions
outbreak	• Provision of adequate fire-fighting equipment capable of fighting all classes of fire • Put — ‘No Smoking’ Signs in areas where inflammable is stored and designating smoking zones within the project areas with ash trays. • Train workers on the use of fire-fighting equipment • Develop an emergency response plan. • Establish fire assembly points in every site. • Avail inspected and appropriate fire extinguishers near generator and other flammable materials. • Employ trained fire marshal in all active sites.
	• Trainings and audits for the workers on Occupational Health and Safety, first aid and fire safety
Social Impacts	
Removal of Structures and Loss of livelihood	• Implement RAP & LRP before commencement of civil works at the affected sites. The RAP exercise was done and a report was prepared and shared separately. • Obtaining letters of no objections from relevant stakeholders before implementation of construction works • Limit damage to property by observing construction area limits • The Contractor and Consultant shall communicate with the owners of the potential structures to be removed that are within the project sites.
Liability for damage to private property	• The Contractor to promptly repair and reinstate any damages done to private property. • Limit damage to property by observing construction area limits by clear demarcation. • The workers should receive requisite training especially on the operation of the machinery and equipment.
Crime incidences and Vandalism	• Working with local committees e.g., Nyumba Kumi to provide security within the site in addition to the Contractor’s own security. • The Contractor should ensure the proper barricading of the campsite and deploy trained security personnel. • All workers should sign the code of conduct on site and ensure adherence. • The Contractor should prepare and implement a security management plan. • Expelling any employee who persists in any misconduct or lack of care, carries out duties incompetently or negligently, fails to conform to any provisions of the contract, or persists in any conduct which is

Associate d Impacts	Management Actions
	prejudicial to safety, health, or the protection of the environment. • Taking all reasonable precautions to prevent unlawful, riotous or disorderly conduct by or amongst the Contractor's personnel, and to preserve peace and protection of persons and property on and near the site.
Spread of HIV/AIDS, and STI's	• Develop HIV/AIDS awareness programs or initiatives to target the construction workers, community, institutions and the general members of the community, particularly the youth; with the objective of reducing the risks of exposure and the spread of HIV/AIDS. • Provide VCT services on site and encourage workers to undergo the same. • Provision of protective devices such as condoms. • Maximize hiring skilled and unskilled workers from the local community
Impact on traffic and difficulty of access	• Provide accessible diversion routes where possible and communicate to the community in advance. • Hoarding using safety tapes and hard barricades along the open trenches to avoid accidents. • Adequate and appropriate warning signs should be placed at potential risk locations and should be visible at night. The signs should be in a language understandable by all. • The Contractor to expedite construction works to reduce the times where entrances are blocked especially in businesses and home entrances. • Access by residents should be facilitated by installing appropriate firm temporary bridges across open trenches that should have support handrails. • The workers should receive requisite training especially on the operation of the machinery and equipment and those undertaking material delivery from licensed NTSA trainers. • Training workers on traffic management on site and availing trained traffic marshals along roads such as Mwananchi, Kiungani, community, parliament Chady, Quarry road and other un-named roads within the settlement • Provision of appropriate PPEs and safety measures whenever there are works that may require micro tunnelling or deep excavations of the tarmac roads. • Sensitization shall be done to all workers on safe transportation and penalties for not adhering shall be communicated through inductions and toolbox talks. • All motor vehicles should be road worthy and properly serviced. • Drivers should sign codes of conduct. • The Contractor shall provide safe transportation of the skilled workers to site where need be since workers will be sourced locally. This will be by either contracting a licensed public service transport

Associate d Impacts	Management Actions
	provider or using own vehicle that meets requirements for public transport. The workers shall be warned against hanging onto moving vehicles within the site and heavy penalties should be enforced
Interruption of existing amenities	- Formal request for permission should be sought and the relevant institutions such as Kenya Power and Lighting Company, data network companies and NCWSC before undertaking construction works; - Timely reinstatement of damaged utilities - The Contractor to carry out trial pits to identify the existing amenities. This will minimize the number of damages on site
Labour Influx	- Reduce labour influx by giving first priority during labour recruitment to the local community. Specialized workmen may be hired from elsewhere however it is important to train and engage local workers since they may be required for the operation of the project. - The Contractor to develop a labour management plan - The Contractor to liaise with the local authorities and leaders in the recruitment of workers on site. - The works Contractor should be required, under its contract, to prepare and enforce a No Sexual Harassment and Non-Discrimination Policy, in accordance with national laws - Effective community engagement and strong grievance mechanisms on matters related to labour - All workers to sign employment contract including the Code of Conduct. - The Contractor should develop their company's working policy that will be communicated to all workers and ensure compliance on site - Sensitize workers on community based social behaviour and conduct. - Efforts to be geared toward instilling attitudes of tolerance, support and understanding of labour immigrants by the local communities - Identification cards by workers seeking employment should be provided during recruitment - The Contractor to adhere to the minimum wages requirement stipulated in the national laws at the time of construction (the regulations wage orders are usually changed by the National government)
Child labour	- Ensure no children are employed on site in accordance with national labour laws. - Ensure that any child sexual relations offenses among Contractors' workers are promptly reported to the police. - Ensuring all workers sign and adhere to the code of conduct. - Ensure that all the workers have national identification cards.

Associate d Impacts	Management Actions
Gender Equity & Sexual Harassme nt	• The Contractor should be required to prepare and enforce a No Sexual Harassment and Non-Discrimination Policy, in accordance with national laws where applicable. • Strive for an equitable distribution of employment opportunities between men and women. Mainstream Gender Inclusivity in hiring of workers as required by Gender Policy 2011 and 2/3 gender rule; • The Contractor should prepare and implement a gender action plan to include: ✓ Gender mainstreaming in employment at the worksite with opportunities provided for females to work, in consonance with local laws and customs ✓ Gender sensitization of workers (this could be done by the HIV/AIDS services provider) ✓ Provision of gender segregated sanitation facilities ✓ Grievance redress mechanisms ✓ Assessment of main risks (gender-based violence, sexual harassment) within and from the construction activities, as well as opportunities to promote gender equality
Increased GBV	• Develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project e.g. effective and on-going community engagement and consultation, particularly with women and girls; • Ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation • Sensitization of workers and the community on GBV and the various forms. • Having workers sign and comply with the code of conduct. • Heavy penalties to be enforced for workers found to have been the perpetrators in any form of GBV. • For interventions proposed in and near schools table 3-2), the project team should coordinate with the school management to train and sensitize students and pupils about GBV. • Minimal to no interaction with students and pupils during construction of proposed interventions in schools
Sexual Exploitatio n and Abuse (SEA)	• Develop and implement an SEA action plan with an Accountability and Response Framework as part of the C-ESMMP.

E.8 Findings

- The major positive impacts of this project will include improved health, air quality, employment opportunities, economic growth, technology and knowledge transfer, as well as mitigating related adverse impacts.
- The project activities are likely to cause, albeit on a small scale, interruptions with traffic, risk of accidents, emission of dust, waste generation and increase in noise and vibration.
- The study has proposed several measures to reduce negative impacts including amelioration of social negative impacts, noise abatement, waste management, reduction of soil erosion, prevention of accidents and health hazards.
- Monitoring has been identified as an important process in the protection of environment of the project area since it will reveal changes and trends brought about mainly by construction activities.

E.9 Recommendations

The ESIA team recommends the following:

- All the recommendations/ mitigations mentioned in the assessment should be financed, and incorporated in the construction and supervision contracts, technical specifications and the Bill of Quantities.
- The Bid documents prepared for the project to incorporate the Environment, Social Health, and Safety Provisions discussed under Chapter 7 (Environment and Social Impact Assessment and Mitigation Measures).
- The Project should ensure continuous stakeholder engagement throughout all project phases.
- The Contractor will be required to prepare a Construction Environment & Social Management Plan (CESMP) which shall be approved by the proponent before the beginning of works. Within the C-ESMP suite, the following instruments should be prepared:
 - ❖ Health and Safety Management Plan.
 - ❖ Traffic Management Plan.
 - ❖ Labour, Influx and Local Recruitment Management Plan.
 - ❖ Stakeholder management Plan.
 - ❖ Emergency Response Plan.
 - ❖ A Gender Responsive Grievance Redress Management Plan for Internal and external grievances.
 - ❖ HIV/AIDS Policy and Gender Based Violence Management Plan
 - ❖ Child Protection Strategy.
 - ❖ Waste Management Plan.
- The proponent should set up a proper and applicable Grievance Redress Mechanism (GRM) for the project to deal with grievances and issues on the project.
- Diligence on the part of the Contractor and proper supervision by the project Engineer during construction and the initial operation phase is crucial for mitigating impacts.

- Periodic environmental and social monitoring is required by the project Proponent to ensure that mitigation measures have been implemented to prevent or avert any negative impacts of the project.
- At project implementation stage, the Contractor to report monthly ESHS compliance to the project management team comprising of the Project Proponent and Supervision Consultant.
- On completion, AWWDA to commission an independent Consultant to undertake an initial Environment, Social, Health and Safety Audit as required by and Environmental (Impact Assessment and Audit) (amendment) Regulations, 2019. The audit will identify nonconformities which the Contractor together with AWWDA will address through the defect liability period of the project. This audit will also form the basis of annual project self-audits by AWWDA.
- The proponent to implement RAP/LRP before project implementation.

E.10 Conclusion

The proposed project is environmentally, legally, and socially acceptable. The proposed project as noted from the assessment is likely to generate both positive and negative impacts within the project area. It is worth noting the potential significant environmental impacts can be adequately mitigated by the proposed measures, and it is the responsibility of the Proponent and all other Project Implementation Unit to ensure the measures are implemented and strict compliance during project implementation. An ESMMP has been prepared, and it includes: the impacts, the mitigation plan; the monitoring and enforcement requirements; and the responsible persons/organizations. The ESMMP been a dynamic document will form as a guide in the enforcement of the proposed mitigation measures and developing mitigation measures for emerging issues in the project areas.

It is based on the above, that it is recommended that the project be issued with the necessary clearance and licensing for the project to commence implementation

CHAPTER 1: INTRODUCTION

1.1. PROJECT BACKGROUND

water access to residents of Nairobi and 13 Satellite Towns Namely Kikuyu, Ruiru-Juja, Kiambu, Karuri, Githunguri, Mavoko Municipality, Ngong Township, Ongata Rongai, Thika, Gatundu, Limuru, Lari and Tala-Kangundo. Under the Nairobi Water and Sanitation Project (NWSP) financed by the Agence Française de Développement (AFD) and the Government of Kenya, Athi Water Works Development Agency (AWWDA), intends to implement last-mile works for the Northern Collector Tunnel. They involve expanding and upgrading local distribution networks to deliver reliable water to households, institutions, and businesses in underserved and rapidly growing areas.

The proposed works are located within several key urban and peri-urban areas of Nairobi, Kajiado and Kiambu Counties, specifically Embakasi KDF Camp, Syokimau, Mlolongo, Thindigua, Lioki, and Fourways. These areas have been prioritized due to their rapidly growing populations and existing water service gaps.

This ESIA is for the proposed works in Syokimau, Mlolongo and Katani.

1.2. PROJECT JUSTIFICATION AND BENEFIT

Access to improved water services remains a nationwide problem in Kenya. Despite the existing extensive water infrastructure managed and operated by MAVWASCO sourced from the Nairobi City Water and Sewerage Company. Syokimau, Mlolongo, Katani areas and environs areas continue to suffer from lack of portable water with the resident relying on boreholes, well and vendors for water supply.

The Northern Collector Tunnel (NCT) project provides a significant daily water supply of 5 million liters to the Mavoko Water and Sanitation Company (MAVWASCO) to enhance water access in Athi River, Syokimau, Katani, Mlolongo, and other surrounding areas. However, residents of Syokimau, Mlolongo, Katani and environs are yet to benefit from this water supply due to lack of distribution lines hence the proposed project is conceived to lay of 45Km of OD160 - 63 distribution lines in these areas to enable water supply.

1.3. OBJECTIVES OF THE ESIA

1.3.1 General Objective

The general objective of the ESIA study is to carry out a systematic examination of the present environmental situation within the project area to determine whether the proposed project will impact adversely on the physical and biological environmental elements within the project area. This is in line with Section 58 (1 and 2) of EMCA 1999 amended 2015, that requires proponents to carry out ESIA study reports on projects as per the second schedule of the Act.

1.3.1 Specific Objectives of ESIA Investigations

The objectives of the assessment were:

- i. To present existing environmental, social and cultural setting of the target project area

- ii. To identify potential environmental and social impacts (direct and indirect), including opportunities for enhancement; this includes the cumulative impact of the proposed project and other developments which are anticipated;
- iii. To generate feasible alternative investments, sites, technologies, and designs,
- iv. To prepare grievance redress mechanism plan
- v. To provide preventive, mitigating, and compensatory measures
- vi. To provide detailed results of the public consultation and
- vii. To prepare an Environmental and Social Management and monitoring Plan to mitigate the identified impacts so as to ensure sustainability of the proposed projects.
- viii. To recommend cost effective measures to be implemented to mitigate against the expected impacts

1.4. Project Study Scope and Objectives

1.4.1 Project Objectives

The main objective of this proposed project is:

- d) To increase daily clean water supply
- e) To meet the growing water demand in the region and reduce previous supply deficits.
- f) To improve water supply, increase coverage, and reduce the burden of water collection for many residents.

1.4.2 Scope

In accordance with the Terms of Reference for the Consultancy Contract, the scope of services to be provided by the Consultant include the following:

- i. Field Exercise and validation of the proposed water supply option
- ii. Integrated Environmental and Social Impact Assessment (ESIA)

1.5. ESIA Approach and Methodology

The ESIA was carried out in line with the provisions of the Environmental Management and Coordination 2015 and the Environmental (Impact Assessment and Audit) Regulations 2003 emended in 2019. An Environmental and Social Management Plan comprising of an impact mitigation plan and modalities for monitoring and evaluation were then developed to guide environmental management during all phases of project development. The assessment involved the following:

1.5.1 Literature Review

The Consultant reviewed literature related to the proposed project and the project area. These included, project drawings, and other studies on physiography, geology, hydrogeology, water resources and socio-economics of the project area. Legislation, policies and procedures in social and environmental management were also reviewed.

1.5.2 Environmental and Social Screening

Screening process was undertaken to decide whether the proposed water supply project that will comprise laying of 45Km of OD160 - 63 distribution lines within Mlolongo, Syokimau, Katani, Laying Pipe

Diameter (OD) Length (m) 160 mm 1,074.00 and 110 mm 617.00 at Embakasi KDF and Laying Diameter (OD) Length (m) 315 mm 2,280 at JKIA needed to be subjected to an ESIA study or not. The Environmental Management and Coordination Act (EMCA) 2015 specifies the projects for which should be subjected to an Environmental and Impact Assessment (EIA) before commencement of project activities. In this this schedule water supply and distribution infrastructure are classified under Low Risk projects requiring preparation of a Summary Project Report. The project belongs to the activities listed in Schedule I (c) Community water project.

Based on this classification the proposed project was therefore subjected to an Environmental and social impact Assessment. AWWDA herewith referred to as the proponent, appointed Egis in joint venture with Losai Management Limited a firm of expert to undertake the ESIA assessment and prepare an ESIA report in fulfillment of the EMCA 2015 and Environmental (Impact Assessment and Audit) Regulations, 2019.

1.5.3 Environmental and Social Scoping

Scoping process involved the identification of significant environmental and social issues associated with the proposed works. The impacts of the proposed project were assessed through project site visits and the following;

- Evaluation of the location, extent of the water connections and the current land use of the affected area.
- Evaluation of the design and proposed construction activities, materials and methodology
- One on one interviews with key stakeholders and proposed project beneficiaries were applied in the determining location of pipeline available way leaves especially in areas where there are no settlements and general opinions of the people
- Discussion with the area residents on the potential impacts related to project implementation activities and corresponding mitigation measures.

1.5.4 Baseline Data Collection

Baseline data were collected on the proposed project site and the area residents. Data collection began in September 2025 and continued throughout the ESIA process.

The data collected was on aspects such as: topography, local flora and fauna, soils and geology, socioeconomics, existing and past activities including human settlements, local surface and ground water resources, ambient air quality and noise levels (qualitative), waste management practices, and natural resources and cultural heritage aspects of the project areas.

1.5.5 Identification, Prediction and Determination of Environmental Impacts

A systematic approach was used to rank identified impacts according to their significance determined by consideration of project activity **event magnitude** and **receptor sensitivity**. The expected significance of environmental impacts was assessed considering:

- **Extent:** An area of influence covered by the impact. In this sense, if the action produces a much-localized effect within the space, it is considered that the impact is low (1). If, however, the effect

does not support a precise location within the project environment, having a pervasive influence beyond the project footprint, the impact will be at location level (3) or could be County (5)

- **Timing:** Refers to the moment of occurrence, the time lag between the onset of action and effect on the appearance of the corresponding factor. We consider five categories according to this is zero, up to 1 year (short term), or more than two years, which are called respectively medium term (3), long-term (4), and permanent (5).
- **Intensity:** refers to the degree of impact on the factor, in the specific area in which it operates, ranked from low (1) to high (5).
- **Probability:** Refers to the likelihood of the impact occurring during the project implementation, this is also ranked as Probable (1) to highly probable.

Receptor Sensitivity determined by:

- **Presence** – whether biological species present are unique, threatened, protected or not vulnerable and are present during a period of high sensitivity (e.g. breeding, spawning or nesting). For human receptors, whether they are permanently present to uncommon in the area of impact and for physical features whether those present are highly valued or of limited or no value. For physical receptors/features, whether they are national or international value (e.g. state protected monument), local or regional value and is sensitive to disturbance or none of the above; and
- **Resilience** – how vulnerable people and/or species and/or features are to the change or disturbance associated with the environmental interaction with reference to existing baseline conditions and trends (such as trends in ecological abundance/diversity/status, ambient air quality etc.) and their capacity to absorb or adapt to the change. For physical receptors/features, highly vulnerable, undergoes moderate but sustainable change which stabilizes under constant presence of impact source or unaffected or marginally affected.

1.5.6 Stakeholder Consultations

Stakeholder consultations were carried out to: inform project stakeholders of the proposed project; to explain the likely impacts (positive/negative) of implementing the project; and to obtain views, concerns, comments and suggestions from interested and affected parties regarding the proposed project.

Key informants' interviews, administration of structured questionnaires and public meeting was held (filled questionnaires and Minutes are annex 3 & 5). Detailed outcome of consultation including stakeholders interviewed is discussed in chapter 6 of this report.

CHAPTER 2: PROJECT DESCRIPTION

2.1 Existing Water Supply Condition

MAVWASCO's water supply comes from multiple sources, including bulk supply from Nairobi City Water & Sewerage Company, local abstraction from Kenya Meat Commission (KMC) and Portland dams, and water from boreholes. Additionally, MAVWASCO is increasing its water capacity and infrastructure to serve more residents in areas like Athi River, Syokimau, Katani, and more, aiming to reduce the existing water supply deficit.

The details of the system are summarized in the table below.

Table 2-1: Existing system details for syokimau-mlolongo

Existing Water Supply Infrastructure	Key Components	Functionality
Mainline	• DN 500mm pipeline along Mombasa Road	• Operational but has missing links
Distribution Network	• DN 160mm off Syokimau Airport Road • DN 160/110mm along Katani Road • DN 160 along Parliament Road	• Operational but limited coverage
Storage	• 200m³ Elevated steel tank	• Operational

2.1.1 Sources of Water

2.1.1.1 Bulk Water from Nairobi:

MAVWASCO receives bulk water supply from the Nairobi City Water & Sewerage Company, which serves areas like Syokimau, Katani, Mlolongo, Sabaki, and Athi River.

2.1.1.2 Local Abstraction:

They also abstract water from the KMC and Portland (Kasuitu) dams in Athi River.

2.1.1.3 Boreholes

MAVWASCO extracts approximately 7,000 m³ of water monthly from boreholes to supplement their supply.

2.1.2 Service Areas and Expansion

MAVWASCO currently serves areas including Athi River town, Great wall gardens, Gimu, Green Park, and Lukenya. Ongoing expansions are underway to include Utawala, Kinanie, and Kitengela. The company aims to significantly increase water volumes to reduce the supply deficit by completing infrastructure like the Northern Collector Tunnel and Karimenu II Dam.

2.1.3 Distribution Methods

Treated Water Distribution: Water from the KMC and Portland dams is treated at the MAVWASCO treatment plant and then distributed to the surrounding areas.

Water Kiosks: For informal settlements and low-income areas, MAVWASCO supplies water through water kiosks to ensure broader access.

2.2 Proposed Interventions

Athi water Works Development Agency (AWWDA) with financial support from Agence Française de Développement (AFD) and the Government of Kenya proposes to improve water supply and increase connectivity within Mavoko Water and Sanitation Company area of jurisdiction by implementing the Proposed water supply project that will comprise laying of 45 Km of OD160 - 63 distribution lines within Mlolongo, Syokimau and environs as described below:

- Syokimau–Airport Road – 4.0 km total
 - 1.0 km DN 160 mm HDPE pipeline
 - 3.0 km DN 110 mm HDPE pipeline
- Chady Road Mains – 1.2 km total
 - 0.6 km DN 160 mm HDPE pipeline
 - 0.6 km DN 90 mm HDPE pipeline
- Mwananchi Road Mains – 3.5 km total
 - 2.0 km DN 160 mm HDPE pipeline
 - 1.5 km DN 110 mm HDPE pipeline
- Kiungani Road – 4.5 km total
 - 2.5 km DN 160 mm HDPE pipeline
 - 2.0 km DN 110 mm HDPE pipeline
- Community Road Mains – 4.7 km total
 - 2.2 km DN 160 mm HDPE pipeline
 - 2.5 km DN 110 mm HDPE pipeline
- Katani Road Water Mains – 4.2 km total
 - 4.2 km DN 160 mm HDPE pipeline
- Parliament Road – 3.9 km total
 - 0.6 km DN 160 mm HDPE pipeline
 - 3.3 km DN 90 mm HDPE pipeline
- Quarry Road Mains – 4.0 km total
 - 4.0 km DN 160 mm HDPE pipeline
- Katani Estate Main Pipeline Supply – 5.5 km total
 - 5.5 km DN 160 mm HDPE pipeline
- Katani Road Offtake 1 – 3.0 km total
 - 3.0 km DN 110 mm HDPE pipeline
- Katani Estate Offtake 2 – 2.0 km total
 - 2.0 km DN 90 mm HDPE pipeline
- Katani Road Offtake 3 – 3.0 km total
 - 3.0 km DN 110 mm HDPE pipeline
- Mlolongo Missing Link – 0.9 km total
 - 0.9 km DN 200 mm Epoxy Steel pipeline

2.2.1 Cost of Proposed Works

The estimated cost of the proposed project is One hundred forty-two million, fifty-eight thousand, one hundred sixty-six and five cents Kenya Shillings (Ksh 142058166.5) and is as provided in the below Table 2-2 below:

Table 2-2: Overall cost estimates

SUMMARY PAGE		
Item	Bill Name	Amount
0	Preliminaries	9120000
1	Missing links	16,494,272
2	Syokimau	90,473,272
3	Embakasi KDF pipelines	17,383,442.46
4	JKIA water distribution	2,381,180.00
3	ADDITIONAL SECTIONAL VALVES	6,206,000
	TOTAL	142058166.5

2.2.2 Implementation Arrangement

Athi Water Works Development Agency (AWWDA) as the Employer, will be directly responsible for the implementation of the project. As indicated in the Terms of Reference (ToR) for the Consultancy services, it is envisaged that AWWDA will appoint a competent person from among their staff as "the Engineer". The Engineer will delegate appropriate duties and responsibilities to the Consultant for the administration of the contract, coordination and supervision of the project.

It is imperative that the Client constitutes a Project Implementation Team (PIT) for project monitoring. The team should meet regularly preferably monthly to review progress and resolve any bottlenecks hindering project implementation. The PIT team should preferably consist of: representatives of the Client, Consultant (Resident Engineer), Contractor (Site Agent), nominated representatives of Syokimau, Mlolongo and Katani area and representatives from JKIA and Embakasi KDF, Mavoko Water and Sewerage Company (MAVWASCO) and Nairobi Water and Sewerage Company (NCWSC).

CHAPTER 3: ENVIRONMENTAL AND SOCIAL BASELINE CONDITION

3.1 Introduction

Baseline conditions entail the sum-total of all biophysical and geo-physical condition of the project area. Gathering of baseline data is necessary to meet the following objectives:

- To understand key social, cultural, economic, and political conditions in areas potentially affected by the proposed project;
- To provide data to predict, explain and substantiate possible impacts;
- To understand the expectations and concerns of a range of stakeholders on the proposed development;
- To inform the development of mitigation measures; and
- To benchmark future socio-economic changes/impacts and assess the effectiveness of mitigation measures.

3.2 Geographical characteristic of the project area

3.2.1 Location

Mlolongo is a town in Machakos County, Kenya, located about 20 kilometers southeast of Nairobi along the Nairobi-Mombasa highway. It is a bustling, rapidly developing area known for its industrial parks, warehouses, and role as a significant transit point for goods and people traveling between Nairobi and Mombasa.

Syokimau is a residential and commercial suburb located in Machakos County, Kenya, situated just south of Nairobi and the Jomo Kenyatta International Airport (JKIA). It is strategically positioned off Mombasa Road and serves as a major transportation hub, hosting the Nairobi terminus for the Standard Gauge Railway (SGR)

Katani is a rapidly growing residential suburb located south-east of Nairobi, Kenya, near Jomo Kenyatta International Airport (JKIA) and the Standard Gauge Railway (SGR) line. It is strategically situated off Mombasa Road and accessed via Mombasa Road, Kangundo Road, the Eastern Bypass, and Katani Road, which connects it to neighboring areas like Syokimau, Utawala, and Ruai.

Jomo Kenyatta International Airport (JKIA) is an international airport Serving Nairobi, the capital and largest city of Kenya. It is located in the Embakasi Suburb, approximately 18 kilometres (11 mi) Southeast of Nairobi city centre.

Embakasi Garrison is a barracks in Nairobi County, Kenya. Embakasi Garrison is situated nearby to the suburb Umoja, as well as near Utawala.

3.2.2 Project Target Area

The largest part of the project is located in Machakos County, Athi River Sub County and covers Syokimau Sub-Location in Mlolongo Location and Katani Sub-location in Katani Location. It is also part of Syokimau/Mlolongo and Kinanie Wards in Mavoko Constituency. The project target area covers approximately 40km². The remaining sections JKIA and Embakasi Garrison are situated in Nairobi County.

The population of the project area in accordance with the Kenya National Bureau of Statistics (KNBS) 2019 census report was as follows: -

Table 3-1: Population of the Project Area

County	Sub-County	Location	Sub-Location	Area (km ²)	Population (2019)	Households	Density	Project Coverage Area (km ²)	Project Coverage Area (%)
Machakos	Athi River	Mlolongo	Syokimau	19.5	36,862	10,185	1,889	17.8	91%
			Sub-Total 1	20	36,862	10,185	1,890	18	91%
		KATANI	Katani	30	10,093	2,876	178	22.2	74%
			Sub-Total 2	30	10,093	2,876	336	22	74%
			Total	50	46,955	13,061	949	40	81%

3.2.3 Climate

The general climate of Machakos County is semi-arid with an altitude range of 1000 – 1600 meters above sea level. There are two rainy seasons but rainfall can be moderate. The cloudiest part of the year is just after the first rainy season, when, until September, conditions are usually overcast with drizzle. The area is characterized by sunny daylight and chilly night. The proposed project site is to the northwest of the Mlolongo town and it experiences relatively dry conditions just like the entire region.

Jomo Kenyatta International Airport (JKIA) and the nearby Embakasi Garrison is a subtropical highland climate featuring warm days, cool nights, and two distinct rainy seasons.

3.2.4 Geology

The geology of the project area consists of a relatively flat-lying, gently sloping landscape primarily composed of clay-rich soils and Athi series aquifers, as well as the Kapiti phonolite series with intercalated lake sediments. The presence of phonolite lava, remnants of a Tertiary-era lava flow, also characterizes the broader Machakos area. These geological features contribute to the area's hydrology, with the poorly drained clayey landscape increasing runoff and susceptibility to flooding, particularly with increased impervious surfaces from urbanization.

The geology of the Jomo Kenyatta International Airport (JKIA) and Embakasi Garrison area consists primarily of Cenozoic volcanic rocks, specifically superficial alluvium, black cotton soils, and weathered volcanic tuffs.

3.2.5 Topography

The project area has gently sloping, clay-filled landscape that is generally characterized by a low-lying, gently undulating topography with slopes decreasing towards the west. This landscape is prone to flooding, especially as urbanization leads to more impervious surfaces that increase rainfall runoff.

Upper Machakos and Nairobi's main drainage follows the regional slope of the volcanic rocks towards the east, while subsidiary internal drainage into the Rift region is confined to the western part. Major plains which comprising mainly the Athi plains and the northern section of the Kapiti plain, extend westwards,

rising from 4900 feet (1493 m) at the Athi River to 6000 feet (1829 m) in the faulted region near Ngong. The Kirichwa Valley Tuffs lying to the east of the highway function like a sponge and the contact between them and the underlying impermeable phonolite thus forms a perfect aquifer so much so that a number of channels containing water occur beneath Athi River region. The site of the project is flat and therefore with heavy rains flooding might result. The proponent is advised to construct a strong floor slab that is well raised to avoid any water surges to the project development.

Jomo Kenyatta International Airport (JKIA) and the nearby Embakasi Garrison lie on a relatively flat, open plateau in Nairobi's southeastern sector, sitting at an average elevation of about 1,600 meters (5,250 feet) above sea level

3.2.6 Water Resources

In general groundwater in volcanic rocks is limited to fractures and erosion levels within the volcanic succession. Fresh lavas are usually not water bearing because of their massive and impervious nature. The most significant aquifer system west of the project area is the Upper Athi Series aquifer system. This is the main aquifer for boreholes in Upper Machakos, Nairobi and Kiambu areas and is composed of tuffs, lakebeds and sediments. The rocks in the Upper Machakos regions such as Mavoko, Syokimau and Mlolongo area mainly comprise a succession of lavas and Pyroclastics of the Cainozoic age and overlying the foundation of folded Precambrian schist's and gneisses of the Mozambique basement rock which traverses the entire lower eastern region upto Kilimambogo area. The crystalline rocks are rarely exposed but occasionally fragments are found as agglomerates derived from former Ngong volcano. The soils of this area are products of weathering of mainly volcanic rocks. Weathering has produced black cotton soils that reach more than 50 feet (15m) in thickness.

Metamorphism process is witnessed in the region that has resulted to major deposits of limestone rich mines.

3.2.7 Land Use

Syokimau's land use plan is influenced by rapid urbanization and commercial expansion, leading to changes from residential to commercial use, and development of new hubs along major transport corridors like Mombasa Road. There isn't one single, universally approved, overarching plan for the entire area, which has led to issues with construction approvals and a need for structured guidelines. Plans are being developed by various stakeholders, including the Syokimau Residents Association and Machakos County, focusing on zoning, infrastructure, and managing the impact of growth on existing areas.

There is no single, publicly accessible comprehensive land use plan for Mlolongo; instead, planning is managed at the county level, with specific issues like infrastructure and plot verification being addressed through various exercises and reports. The Machakos County Government, which governs Mlolongo, is involved in land planning through initiatives like a recent plot verification exercise, and there are academic studies and county-level plans like the MAVOKO Integrated Urban Structure Development Plan that guide development in the area. Factors such as its proximity to Nairobi, the Nairobi- Mombasa Road, and rapid population growth are key considerations in Mlolongo's land use challenges and future planning.

The land use plan for Katani is primarily governed by Machakos County's overall development plans, which have a strong focus on residential, commercial, and mixed-use development

Jomo Kenyatta International Airport (JKIA) and the Embakasi Garrison serve as major strategic, industrial, and security land-use zones in Nairobi's eastern corridor.

3.2.8 Socio-Economic Activities

Social and economic activities in Syokimau revolve around its real estate growth, commercial centers, and transportation links, with key activities including a booming real estate market, retail and entertainment at malls like Gateway and Signature Mall, and commuter transport via the Nairobi-Syokimau Standard Gauge Railway and road networks. Residential development is a major driver, supported by commercial hubs and public transportation that connect residents to Nairobi's CBD.

Social and economic activities in Mlolongo include a mix of commercial businesses like small shops and casual labor, driven by its location as a transit and residential hub along the Nairobi-Mombasa highway. There are also significant NGO and community-based programs focusing on social support like aid for HIV/AIDS affected families, women's economic empowerment through vocational skills like sewing, and childcare services. Additionally, Mlolongo is part of a broader region where agriculture (including maize, coffee, sorghum, and millet) is practiced, and it serves as a gateway for tourist activities in the surrounding Machakos County, such as cultural experiences, and visits park and natural reserve

Social and economic activities in Katani include stone quarrying and related industries, which provide employment but also cause environmental concerns like air and noise pollution. Other economic activities are real estate development and hospitality, driven by its proximity to Nairobi. Socially, residents engage in recreational activities at local resorts and lounges, with plans for more facilities like a children's park near the dams

Socio-economic activities around Jomo Kenyatta International Airport (JKIA) and the Embakasi Garrison center on aviation logistics, heavy manufacturing, commerce, and community-military infrastructure partnerships.

3.3 Flora and fauna

3.3.1 Flora

Natural vegetation in Upper Machakos region (Syokimau, Mlolongo and Athi River) has been cleared to pave way for the establishment of both residential and commercial developments. The natural vegetation in the area has thus been greatly modified. The remnants of the natural vegetation of the site and its environs are a few scattered grasses. The site has no great vegetation cover and it is predominantly dry savannah, open grass plains with scattered acacia bushes. The region also has seasonal stream which supplies water to a nearby wetland. The proponent is encouraged to do a lot of landscaping to provide greenery and maintain a healthy environment

3.3.2 Fauna

This will look at the aquatic and wetland faunal species as well as terrestrial species. The site is situated within a residential zone where human activities have altered the natural habitat for animals over the years. The principal source of water for this region is MAVWASCO and private water suppliers. The project's effect may seem insignificant to such lives but it is of great concern to the environment at large. It is expected that the area will be populated by small mammals such as mice, rats, moles and other

members of the Rodent Family. Bird species were also observed at the site. None of the faunal species observed are rare or endangered.

The fauna around Jomo Kenyatta International Airport (JKIA) and the Embakasi Garrison includes local grassland wildlife, birds, and occasional wandering mammals from the adjacent Nairobi National Park.

3.4 Sensitive Receptors

The assessment identified several receptors located within proximity of 200m to 500m to the proposed water distribution lines that might be affected by Project civil activities at the time of construction. The receptors might suffer damage associated with the Project activities through disruptions, health and safety impacts and social issues. The sensitive receptors are presented in the table below, Likely impacts that the Project can pose to the receptors are summarized below.

- Health and Safety risks associated with accidents involving contractor's equipment and plant, open excavations and destroyed access culverts can also pose risk to students, patients, worshipers and public.
- In the case of hospitals and health centres, open trenches can restrict movement of ambulances, fire engines movement can also be restricted in times of emergencies
- Dust pollution triggered by movement of plants and equipment on dusty roads pose health risks (respiratory illness)
- Noise and excessive vibrations beyond 60 decibels during the day pose health risk (ear related illness)
- Destruction of existing public utilities, especially domestic water pipeline, this situation would trigger grievances from the users or contamination of the water.

Table 3-5 presents the sensitive receptors identified in Mlolongo, Syokimau ,Katani, Emabakasi Garriosn and JKIA and environs herein referred to as the Project area.

Table 3-2: Sensitive Receptor within the Project areas

Project area	Type of receptor	Name of Receptor
Syokimau	Learning institutions	✓ Mt. Sinai CMI School
		✓ Jewel House School
		✓ Jesus Winner pre-school
		✓ Little Stommers School
		✓ The Bracha School
		✓ Cleverland School
		✓ Brookhill Academy Kindergarten & Primary

Project area	Type of receptor	Name of Receptor
		✓ Notre Dame School
Mlolongo		✓ Mother Theresa KII Junior School
Katani		✓ SFS Primary School
		✓ Goodrich International School
		✓ Maryland School
		✓ Blessed assurance School
		✓ Bridge Morello girls School
Syokimau	Other Institution	✓ Syokimau Police Station
Syokimau	Business area	✓ Affordable housing units
Mlolongo		✓ Quick mart
Katani	Health Facilities	✓ St Francis Church dispensary
Syokimau		✓ Syokimau Hospital A Level 4 Facility
		✓ Mother Teresa Rodon Health Centre
Syokimau	Worship centre	✓ Mosque
		✓ City of transformation Church
Katani		✓ Redeemed Gospel Church
Mlolongo		✓ Faith Mission Community Church
Syokimau	Dam	✓ Syokimau Dam
JKIA	Airport	✓ Jomo Kenyatta International Airport
Embakasi	Embakasi KDF	✓ Embakasi Garrison



An health center in syokimau- Access may be affected during construction



Police station within project area



A school within the project area



A school within the project area

Figure 3-1: Sample Sensitive Receptors

CHAPTER 4: ANALYSIS OF PROJECT ALTERNATIVES

4.1 Overview

Regulation 18(1) of Legal Notice 101 specifies the basic content of an Environmental Impact Assessment Study / Project Report subsequent to which, subsection (i) requires an analysis of alternatives. Analysis of Project Alternatives requires comparison of feasible alternatives for the proposed Project in terms of: Project site, Project technology, Potential Environmental and Social Impacts, capital and recurrent costs, suitability under local conditions, and acceptability by neighboring land users.

This chapter describes and examines the various alternatives considered during the design of the Project. The consideration of alternatives is one of the proactive sides of environmental and social assessment required to enhance Project design. This is achieved through examining options instead of only focusing on the more defensive task of reducing adverse impacts of a single design option. The alternative that was considered for the project was focused on:

- Project resettlement impacts
- Analysis of alternative materials
- No project alternative
- Proposed project option

4.1 Project Resettlement Impacts

The design team has ensured as much as possible that the project shall be constructed within available public land and existing way-leaves. This shall eliminate cases of resettlement and reduce project costs that are usually related to compensation. However, there are a number of encroachments in the wayleave, a livelihood restoration plan has been prepared as separate document to guide compensation for disturbance due to interference likely to be caused during construction works. The contractor shall also be expected to undertake reinstatement of any destroyed structure immediately after completing the work at the location of the structure.

4.2 Analysis of Alternative Materials

The proposed project shall be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that saves energy and water shall be given first priority without compromising on cost or availability factors. The use of local stones, cement, sand (washed and clean), metal bars, pipes and fittings that meet the Kenya Bureau of Standards requirements is recommended.

4.3 No Project Alternative

This alternative describes a situation where the proposed projects shall not be put up. It is advantageous in that there shall be no negative impacts to the environment.

The no project action alternative shall however lead to the following (general) major negative and long-term impacts:

- i. There shall be no increased local income from sale of construction materials from their firms and also renting spaces for camp sites (Lost business opportunities).
- ii. There shall be no economic growth in the target project area if the project is not implemented since no use of locally available materials during the construction phase for example cement and pipes that can be purchased in the area
- iii. No new employment shall be created if the proposed intervention is not implemented.

- Creation of employment opportunities is expected to arise during construction as well as the operation phase of the project
- iv. The targeted populations (Residents of Syokimau, Mlolongo, Katani, Embakasi Garrison and JKIA and environs) shall not benefit from the supply of safe, reliable adequate water
 - v. Women and girl child shall continue having the burden to collect water from the boreholes; with the provision of enough safe water, both for drinking, washing, cleaning as well as kitchen gardening, time spent to fetch water for storage shall now be used for other activities such as running businesses for women kitchen gardening while the girls can use that time for studying.
 - vi. Improved Hygiene and Sanitation standards shall not be attained in the project target areas. Good Hygiene and Sanitation Standards are directly linked to provision of reliable and adequate water supply as well as provision of adequate sanitation facilities.
 - vii. Improved revenue for Mavwasco and NCWSC shall not be attained without the increased number of residents being served.

The No Project alternative is therefore not a viable alternative to adopt for this project, this is due to the fact that implementing the proposed project is linked with benefits such as relieving the target population in Syokimau, Mlolongo, Katani and the surrounding environs from water problems, improve sanitation in the area, creation of employment, and increased local incomes amongst other benefits.

4.4 Proposed Project Option

The proposed project shall involve water supply in Syokimau, Mlolongo, Katani, Embakasi Garrison and JKIA and environs. The impacts and mitigation measures for this alternative are discussed in detail throughout this report. The positive impacts have been identified. This alternative shall have minimal impacts on the physical environment and has considered the necessary measures to eliminate the identified issues of concern. The alternative is likely to have the greatest implications on socio-economic environment of the area and surrounding communities. Due to the proposed quality of the development, it is anticipated that it would provide a major opportunity for area development, employment opportunities via business environment and accessibility to services to both the residents and non-residents of the area. In addition, a development of this caliber shall add to the locality's ability to fuel the growth and development of the wider environment.

The merits of this alternative are as follows:

- There shall be a stable and reliable clean water supply
- The community shall have potential source of income through the supply of materials at the site, self- sustainability, employment opportunities and better service delivery in the long run;
- The local and national economies shall improve from the revenue collected from the sale of water.
- There shall be job creation especially during the construction project period
- The property (land) value shall appreciate;
- Visual and aesthetic amenities shall be improved;

From the above analysis of alternatives, the 'Proposed Project Option' is the most valid option that should be adopted since it has more positive impacts to the environment and the community in the project area as a whole with minimal negative impacts that can be minimized or avoided with the implementation of the proposed mitigation measures in the ESMMP

CHAPTER 5: LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK

5.1 Introduction

This chapter therefore outlines the policy, legal, regulatory, and institutional framework for Environmental Management in Kenya which calls for compliance by all development Projects.

5.2 Overview of Relevant Legislation

5.2.1 Constitution of Kenya

The Constitution of Kenya (CoK), at Article 43(1), provides that every person has the right—
(b) to accessible and adequate housing, and to reasonable standards of sanitation;
(d) to clean and safe water in adequate quantities.

These provisions place an obligation on state organs to ensure the availability and accessibility of not only clean and safe water, but also in adequate quantities, for all people they serve.

Article 42 of Bill of Rights of the Kenyan Constitution provides that every Kenyan has a right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislation and other measures.

Part II of Chapter 5 of the Constitution (Environment and Natural Resources), (I) the State clearly undertakes to carry out the following:

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

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

Relevance to the proposed project.

The project should ensure that the sustainability of livelihoods and biological resources within the project areas are protected. The project proponent shall ensure cooperation with all state organs and relevant stakeholders to conserve the environment during project implementation.

5.2.2 The Environmental Management and Coordination (Amendment) Act, 2015

The Act provides for the establishment of a legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto. Just as in the new constitution, Part II of EMCA confers to every person the right to a clean and healthy environment and to its judicial enforcement. The new Constitution and EMCA therefore obligates the project's Executing Agency and Contractor to work in a clean environment and not to contravene the right of any person within its zone of influence, to this entitlement. EMCA has provided for the development of several subsidiary legislations and guidelines which govern environmental management and are relevant to the project implementation. These

include:

a) The Environmental (Impact Assessment and Audit) Regulations, 2009 Legal Notice No. 101

The Environmental Impact Assessment and Audit Regulations state in Regulation 3 states that “the Regulations should apply to all policies, plans, programmes, projects and activities specified in Part IV, Part V and the Second Schedule of the Act.

Part III of the Regulations indicates the procedures to be taken during preparation, submission and approval of the environmental project report.

Part 4(1) of the Regulation further states that: “no Proponent shall implement a project”

- a) Likely to have a negative environmental impact; or
- b) For which an environmental impact assessment is required under the Act or these Regulations, unless an environmental impact assessment has been concluded and approved in accordance with these Regulation.

Relevance

This ESIA SPR report has been compiled to comply with EMCA and the Environmental (Impact Assessment and Audit) Regulations, 2003.

b) The Environmental Management and Coordination (Waste Management) Regulations, 2006 Legal Notice No. 121

These Regulations were published in the Kenya Gazette Supplement No. 69, Legislative Supplement No. 37, and Legal Notice No. 121 of 29th September, 2006. The regulations provide details on management (handling, storage, transportation, treatment and disposal) of various waste streams including:

- Domestic waste;
- Industrial waste;
- Hazardous and toxic waste;
- Pesticides and toxic substances;
- Biomedical wastes; and
- Radioactive waste.

Regulation No. 4 (1) makes it an offence for any person to dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle. Regulation 5 (1) provides categories of cleaner production methods that should be adopted by waste generators to minimize the amount of waste generated and they include:

- I. Improvement of production process through
 - Conserving raw materials and energy;
 - Eliminating the use of toxic raw materials and wastes;
 - Reducing toxic emissions and wastes.

II. Monitoring the product cycle from beginning to end by

- Identifying and eliminating potential negative impacts of the product;
- Enabling the recovery and re-use of the product where possible,
- Reclamation and recycling and
- Incorporating environmental concerns in the design and disposal of a product.

Regulation 6 requires waste generators to segregate waste by separating hazardous waste from non-hazardous waste for appropriate disposal. Regulation 15 prohibits any industry from discharging or disposing of any untreated waste in any state into the environment. Regulation 17 (1) makes it an offence for any person to engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license issued by NEMA.

Relevance

The proposed project, during construction phases shall generate wastes which shall need to be disposed of as per the guidelines in the regulations.

c) The Environmental Management and Coordination (Water Quality) Regulations, 2006 Legal Notice No. 120

These Regulations were published in the Kenya Gazette Supplement No. 68, Legislative Supplement No.36, and Legal Notice No. 120 of 29th September 2006. The Regulations provides for sustainable management of water resources including prevention of water pollution and protection of water sources (lakes, rivers, streams, springs, wells, and other water sources).

It is an offence under Regulation No. 4 (2), for any person to throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution. Regulation No. 11 further makes it an offence for any person to discharge or apply any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit the dumping or discharge of such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards for effluent discharge into the environment.

Relevance

The proponent should ensure that waste is handled, stored, transported and disposed as per this regulation.

d) The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 Legal Notice No. 61

These regulations were published as legal Notice No. 61 being a subsidiary legislation to the Environmental Management and Co-ordination Act, 2015. The regulations provide information on the following:

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

According to regulation 3 (1), no person shall make or cause to be made any loud, unreasonable,

unnecessary, or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Regulation 4 prohibits any person to (a) make or cause to be made excessive vibrations which annoy, disturb, injure, or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30 meters from any moving source.

Regulation 5 further makes it an offence for any person to make, continue or cause to be made or continued any noise more than the noise levels set in the first schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property.

Regulation 12 (1) makes it an offence for any person to operate a motor vehicle which (a) produces any loud and unusual sound; and (b) exceeds 84 dB(A) when accelerating. According to sub-regulation 2 of this regulation, no person shall at any time sound the horn or other warning device of a vehicle except when necessary to prevent an accident or an incident. Regulation 13 (1) provides that except for the purposes specified in sub-Regulation (2) there under, no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations.

Regulation 19 (1) prohibits any person to carry out activities relating to fireworks, demolitions, firing ranges or specific heavy industry without a valid permit issued by the Authority. According to sub-regulation 4, such permit shall be valid for a period not exceeding three months.

Relevance

The Contractor for civil works shall be required to ensure compliance with the above regulations to promote a healthy and safe working environment throughout the construction phase. This shall include regular inspection and maintenance of equipment and prohibition of unnecessary hooting of vehicles.

e) The Environmental Management and Coordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006 Legal Notice No. 160

Part II of Regulations, section 4 states that no person shall engage in any activity that may have adverse impacts on ecosystems, lead to introduction of exotic species or lead to unsustainable use of natural resources without an EIA license. The regulation puts in place measures to control and regulate access and utilization of biological diversity that include among others banning and restricting access to threatened species for regeneration purposes. It also provides for protection of land, sea, lake or river declared to be a protected natural environmental system in accordance with section 54 of EMCA, 2015

Relevance

Reinstating the project area with indigenous plant species and avoiding invasive species that may negatively affect the project area.

Other relevant EMCA 2015 to be considered during construction and operation of the project are;

- Environmental Management and Coordination (Wetlands, Riverbanks, Lake Shores and Sea Shore Management) Regulation, 2009.
- Environmental Management and Coordination (Fossil Fuel Emission Control) Regulations, 2006

- The Environmental Management and Coordination (Controlled Substances) Regulations, 2007 Legal Notice No. 73.

Relevance

EMCA 2015 and above listed regulations shall form the main statutory instruments which shall guide the implementation of the project so that any likely adverse impacts that could be caused by the project are promptly mitigated as recommended in this assessment. This report is also in compliance with the requirement of the EIA/EA regulations.

5.2.3 Water Act 2016

Section 73 of the Act allows a person with a license to supply water (licensee) to make regulations for purposes of protecting against degradation of sources of water which he is authorized to take. Under the Act, the licensee could be a local authority, a private Trust or an individual and the law shall apply accordingly under the supervision of the Regulatory Agency.

Section 75 and sub-section 1 allows a licensee for water supply to construct and maintain drains and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing water belonging to the licensee or which he is authorized to take for supply from being polluted. However, if the proposed works shall affect or is likely to affect any body of water in the catchment, the licensee shall obtain consent from the Water Resources Authority.

Relevance

This Act shall be relevant during both the construction and operation phases of the project whereby the Contractor and Proponent shall ensure that all relevant water resources are not polluted from both liquid and solid wastes.

5.2.4 Water Resources Regulations, 2021

These Regulations implement provisions of the Water Act, no. 43 of 2016. They shall apply to the regulation, management, use and development of all water resources, perennial or seasonal and including water resources of the territorial sea.

Matters covered by these Regulations include: prescription of water use activities; issue of approvals, permits and authorizations for water use and waterworks; guidelines on surface water, including declaration of a watercourse, wetlands, land reclamation, water use for irrigation and Works Associated for protection and control of fish; groundwater development, including borehole and issue of specific permits and authorizations; water quality monitoring and liquid waste disposal, including control of water pollution, water quality monitoring; inspection and controls concerning waterworks; water use charges, including penalties for misuse or for over-abstraction; roles and powers of water resource users associations and basin water resources committees; identification of protected and designated groundwater conservation areas; composition of reserve; categories of water sector professionals and contractors and issue of related permits and licenses.

Relevance

The project shall ensure adherence to the regulation especially during operation phase

5.2.5 County Government Act No. 17 of 2012

Part II of the Act empowers the county government to oversee functions described in Article 186 of the

constitution, (county roads, water and Sanitation, Health). Part XI of the Act vests the responsibility of planning and development facilitate the development of a well-balanced system of settlements and ensure productive use of scarce land, water and other resources for economic, social, ecological and other functions across a county. This arrangement has been adopted for interventions in order not to conflict with provisions of the Kenyan Constitution.

Relevance

The Contractor will be expected to carry out implementation of the project in consultation with the Machakos County Government and adhering to the established laws and policies

5.2.6 Traffic Act, Chapter 403.

This Act consolidates the laws relating to traffic on all public roads. It also prohibits the encroachment on and damage of roads including land reserved for roads.

Relevance

The proposed project will be laying of pipes along the roads. The project will acquire all necessary permits required before construction works. Trained traffic marshals will be deployed to control human and vehicular traffic on site.

5.2.7 The Physical and Land Use Planning Act, 2019

The Physical and Land Use Planning Act, 2019 is an act of Parliament to make provision for the planning, use, regulation and development of land and for connected purposes. The Act provides a vital link with the Environment Management and Co-ordination Act. For example, Section 36 of the Act states that "In connection with a development application a local authority is of the opinion that proposals for industrial location, dumping sites, sewerage treatment, quarries or any other development activity shall have injurious impact on the environment, the applicant shall be required to submit together with the application an environmental impact assessment report". This reinforces EIA requirements under EMCA 2015

Relevance

The large part of the project is designed to utilize public land and reserves to avoid cases of acquisition of private property and resettlement complications.

5.2.8 Occupational Health and Safety Act (OSHA 2007)

This Act is intended to protect safety and health of workers in workplaces during construction and operation phases. It is tailored at implementation of the EHS plan in compliance with the relevant sections of this Act. The Act provides Occupational Health and Safety guidelines that should be followed and adhered to in any workplace. The proposed improvement works project will provide employment opportunities to many workers at various categories.

Relevance

The Contractor will be required to register site as a workplace with the local county Directorate of Occupational Safety and Health Services (DOSHS) in line with this Act. The Act provides Occupational Health and Safety guidelines which shall be followed by both the Contractor and Supervising Consultant during implementation of the project to avoid injuries and even loss of life to workers and neighbouring community. The ESMMP prepared under this assessment has provided for specific health and safety aspects to be complied with during implementation of the project. The ESMMP also provides mitigation measures

that can be undertaken to ensure compliance with the requirements of this policy.

5.2.9 The Public Health Act (Cap.242)

Part IX section 115 of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires Local Authorities to take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health. Such nuisance or conditions are defined under section 118 and include nuisances caused by accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin.

Relevance

The Act provides guidelines to the Contractor on how he shall manage all wastes (Liquid and Solid Wastes) emanating from the project in a way not to cause nuisance to the community. The Act also shall be applied to ensure that the food that is provided to the workers during construction of the project meets the safety requirements.

5.2.10 Climate Change (Amendment) Act, 2023

The Climate Change Act aims to reduce vulnerability to climate change and improve our country's ability to take advantage of the opportunities that climate change offers. The Act is to be applied for the development, management, implementation, and regulation of mechanisms to enhance climate change resilience and low carbon development for the sustainable development of Kenya.

The Purpose and Objectives Clause of the Act (Part 1, Section 3) provides that-

(2) Without prejudice to subsection (1), this Act shall be applied to all sectors of the economy by the national and county governments to –

- a) Mainstream climate change responses into development planning, decisions making, and implementation.
- b) Build resilience and enhance adaptive capacity to the impacts of climate change.
- c) Formulate programmes and plans to enhance the resilience and adaptive capacity of humans and ecological systems to the impacts of climate change.
- d) Mainstream and reinforce climate change disaster risk reduction into strategies and actions of public and private entities.
- e) Mainstream intergenerational and gender equity in all aspects of climate change responses.

Relevance

The development and implementation of the proposed interventions will contribute toward the stated objectives of the climate change act by mainstreaming climate resilience in the infrastructures.

5.2.11 Employment Act 2007

This is an Act of parliament that applies to all employees employed by any employer under a contract of service. The Act came in operation in June 2008. Employment of children in the following forms is prohibited in the following sections of the Act:

53. (1) notwithstanding any provision of any written law, no person shall employ a child in any activity that constitutes worst form of child labour.

56. (1) No person shall employ a child who has not attained the age of thirteen years whether gainfully or otherwise in any undertaking.

(2) A child of between thirteen years of age and sixteen years of age may be employed to perform light work which is

(a) Not likely to be harmful to the child's health or development; and

(b) Not such as to prejudice the child's attendance at school, his participation in vocational orientation or training Programs approved by Minister or his capacity to benefit from the instructions received.

Relevance

The proponent and the Contractor shall ensure equal opportunity should be given to all both men and women to ensure equity.

5.2.12 Work Injury Benefits Act (WIBA) 2007

It is an act of Parliament to provide for compensation to workers for injuries suffered in the course of their employment. It outlines the following:

- Employer's liability for compensation for death or incapacity resulting from accident.
- Compensation in fatal cases;
- Compensation in case of permanent partial incapacity;
- Compensation in case of temporary incapacity;
- Persons entitled to compensation and methods of calculating the earnings;
- No compensation shall be payable under this Act in respect of any incapacity or death resulting from a deliberate self-injury;
- Notice of an accident, causing injury to a workman, of such a nature as would entitle him for compensation shall be given in the prescribed form to the director.

Relevance

The Contractor shall need to abide by all the provisions of WIBA and have a valid WIBA insurance cover.

5.2.13 The National Museums and Heritage Act-Cap 216 (2006)

Kenya is rich in its antiquities, monuments, cultural and natural sites which are spread all over the country and the Act aims to preserve this national heritage.

The National Museums of Kenya is the custodian of the country's cultural heritage, its principal mission being to collect, document, preserve and enhance knowledge, appreciation, management and the use of these resources for the benefit of Kenya and the world.

Through the National Museums of Kenya many of these sites are protected by law by having them gazetted under the Act.

- Section 30 of the Act requires all discoveries of buried artefacts to be reported to the NMK/GoK.

Relevance

In case of discoveries of buried artefacts reporting to the NMK/GoK will be carried out.

5.2.14 Environmental and Land Court Act (2011)

The Act gives effect to Article 162(2) (b) of the constitution by establishing the Environment and Land Court

that has original and appellate jurisdiction. Per Section 4(2) and (3), it is a court with the status of the High Court. It exercises jurisdiction throughout Kenya and pursuant to section 26, is expected to ensure reasonable and equitable access to its services in every County.

The principal objective of this Act is to enable the Court to facilitate a just, expeditious, proportionate and accessible resolution of disputes governed by the Act.

The Court exercises its jurisdiction under Section 162 (2) (b) of the Constitution and has power to hear and determine dispute relating to: a) Environmental planning and protection, climate issues, land use planning, title, tenure, boundaries, rates, rates, rents, valuations, mining minerals and other natural resources; b) Compulsory acquisition of land ;c) land administration and management ;d) Public private and community land contracts, choses in action or other instrument granting any enforceable interests in land and e) any other dispute relating to environment and land.

Nothing in the Act Precludes the Court from hearing and determining applications for redress of a denial, violation or infringement of, or threat to, rights or fundamental freedom relating to land and to clean and healthy environment under Section 42, 69 and 70 of the constitution.

Relevance

Grievances encountered during implementation of the project will be resolved using the GRM proposed in 4 of this report. Those not satisfied will be advised to seek justice through the environmental court

5.2.15 Sustainable Waste Management Act, 2022;

The Act provides for new governance framework in waste management with establishment of Waste Management Council, expanded role of County Governments and Extended Producer Responsibility Schemes. In addition, the Act prescribes the need to establish new infrastructure for waste management such as segregation at source, proper transportation, material recovery facilities, and closure of dumpsites, sanitary landfills, and national waste information system.

Relevance

The project will generate waste ranging from solid waste such as papers, plastic bottles, cement bags among others and wastewater will also be generated during the construction, operation and decommissioning phases. The Contractor will adhere to the laid out regulations. The Contractor will also engage a NEMA licensed waste handler to ensure proper disposal of waste

5.2.16 The Sexual Offences Act 2006

This is an Act of Parliament to make provision about sexual offences, their definition, prevention and the protection of all persons from harm from unlawful sexual acts, and for connected purposes. The Act is a big step in the fight against sexual offences as it has strong punishment for criminals.

Relevant Sections in this Act include: -

- 24- Sexual offences relating to position of authority and persons in position of trust.
- 25- Sexual relationship which pre-date position of authority or trust.
- 26- Deliberate transmission of HIV or any other life threatening sexually transmitted disease

5.2.17 The Children Act, 2010

This Act protects the welfare of children within the Country. The Act identifies Children as a person below the age of 18 years

old and protects them from exploitation. Of particular importance to this project, is section 10, which protects the child from:

- Economic exploitation (only the people above 18 years will be considered for job opportunities in the project).
- Any work that interferes with his/ her education, or is harmful to the child's health or physical, mental, spiritual, moral or social development

Relevance - The Contractor will ensure all workers provide their Identification cards during recruitment

5.2.18 Kenya Airports Authority (KAA) Act (Cap 395)

Grants the Kenya Airports Authority exclusive jurisdiction over all operations, infrastructure zoning, and access control within JKIA. The ESIA must detail

Relevance –The contractors shall adhere to KAA permit-to-work systems and restricted airside area access clearances

5.2.19 Civil Aviation Act (No. 21 of 2013):

Governs safety protocols under the Kenya Civil Aviation Authority (KCAA). Infrastructural designs (like reservoirs and elevated tanks) must explicitly meet KCAA and **International Civil Aviation Organization (ICAO)** standard structural guidelines to prevent bird attraction hazards or interference with airport communication towers.

Relevance –The proponent will adhere with provision of this act

5.2.20 Protected Areas Act (Cap 204)

Designates JKIA as a protected vital national facility. This law places strict statutory controls on surveying, camera usage, site fencing, and the security vetting of construction workers entering the airport "garrison" zone

Relevance –The proponent will adhere with provision of this act

5.3 Environmental Policy Framework

5.3.1 The National Environment Action Plan (NEAP)

The National Environmental Action Plan (NEAP) was a deliberate policy effort to integrate environmental considerations into the Country's economic and social development. The integration process was to be achieved through a multi-sectoral approach to develop a comprehensive framework to ensure that environmental Management and conservation of natural resources are an integral part of societal decision-making.

Relevance -The NEAP has indicated how resources within sections of the country should be managed to ensure their sustainable utilization. The project should be implemented and operated based on these guidelines.

5.3.2 National Land Policy

Chapter 4 of the land policy under Environmental Management Principles, the policy provides actions for addressing the environmental problems such as the degradation of natural resources, soil erosion, and pollution. For the management of the urban environment, it provides guidelines to prohibit the discharge of untreated waste into water sources by industries and local authorities; it also recommends for appropriate waste management

systems and procedures, including waste and wastewater treatment, reuse and recycling.

The policy goes further to advocate for environmental assessment and audit as a land management tool to ensure environmental impact assessments and audits are carried out on all land developments that may degrade the environment and take appropriate actions to correct the situation. Public participation has been indicated as key in the monitoring and protection of the environment. Chapter 4 further advocates for the Implementation of the polluter pays principle which ensures that polluters meet the cost of cleaning up the pollution they cause and encourage industries to use cleaner production technologies.

Relevance - The project proponent shall implement the ESMMP to ensure that the environment within project area and adjacent areas is not polluted by the subsequent activities during construction and operational phases.

5.3.3 Kenya Vision 2030

The Kenya Vision 2030 aspires for the country firmly interconnected through a network of roads, railways, ports, airports, water and sanitation facilities and telecommunications. According to Vision 2030, Kenya is a water scarce country. The country, therefore, aims to conserve water sources and start new ways of harvesting and using rain and underground water. The 2030 Vision aims at ensuring that water and sanitation is improved, available and accessible to all.

Relevance - The proposed project is in line with the vision 2030 as it shall lead to increased clean and reliable water supply.

5.3.4 The Kenya Environmental Sanitation and Hygiene Policy 2016-2030

The Kenya Environmental Sanitation and Hygiene Policy 2016-2030 (KESHP) envisions a clean, healthy, and economically prosperous Kenya free from sanitation and hygiene related diseases and seeks to ensure universal access to improved sanitation, clean and healthy environment by 2030.

Relevance - The Contractor shall need to abide by this provision by ensuring proper disposal of construction waste.

5.3.5 The National HIV Policy

Ensuring that new development projects encourage preventive and responsible behaviour both for the workers involved in such projects and the local people within which projects are taking place as a goal towards curtailing the spread of the disease.

Relevance- The proponent is advised to put in place adequate measures to ensure that implementation of the proposed projects does not heighten the spreads of HIV and AIDS. Sensitization and trainings will be conducted during the project period

5.3.6 The Policy on Gender and Development, 2019.

The policy provides a framework for mainstreaming gender in all policies, planning and programming. Implementation of the proposed project will create employment and business opportunities.

Relevance - The proponent will ensure that there is equal opportunity for all genders throughout all project phases. There will be no discrimination against people with disabilities.

5.3.7 National Sustainable Waste Management Policy 2021

The policy aims to establish an enabling regulatory environment that prioritizes waste minimization and

contributes to a circular economy. The policy proposes a waste hierarchy that includes reducing waste generation, reusing materials, effective and affordable waste collection, and proper treatment and disposal of residual waste in well-engineered and regulated landfills. The policy also advocates for the creation of green jobs and the formalization of the waste picker sector to improve livelihoods.

Relevance - During the construction period, the Contractor will adhere to the policy by ensuring proper waste management. A licensed waste handler will be contracted to dispose waste in approved dumping sites

5.3.8 National Environment Policy, 2013

The National Environment Policy overall goal is to provide better quality of life in Kenya for present and future generations through sustainable management and use of the environment and natural resources. The relevant policy statements under this section are three; 1) Improve the management and conservation of water supply sources, 2) Promote technologies for efficient and safe water use, especially in respect to wastewater use and recycling and 3) Provide incentives for private sector investment and development of appropriate water and sanitation technologies and infrastructure for waste management.

Relevance - The Project shall implement the Environmental and Social Management and Monitoring Plan (ESMMP) to mitigate the impacts of the resulting construction activities. The proposed project scope will promote the sustainable and access to clean water supply

5.3.9 National Water Policy 2021

The National Water Policy is developed in line with the mandate and mission of the Ministry responsible for water affairs and within the Constitutional framework providing the respect of the human rights to water, sanitation services, and a clean environment, and therefore aims at enhancing sustainable management of water resources, and further, at improving water harvesting and storage, moving so the water sector to the next level of development, in order to contribute to the National Goals, and realization of the Sustainable Development Goals.

This Policy focuses on the following objectives:

- ❖ Strengthening sustainable water resource management;
- ❖ Improving delivery of water supply services through progressive realisation of universal access to water and the human right to water;
- ❖ Promoting the development of water harvesting and storage infrastructure

Relevance – The proposed project water interventions will result in improved water supply within Syokimau, Mlolongo, Katani , Embakasi Garrison ,JKIA and environs

5.3.10 The Kenya Environmental Sanitation and Hygiene Policy 2016-2030

The Kenya Environmental Sanitation and Hygiene Policy 2016-2030 (KESHP) envisions a clean, healthy and economically prosperous Kenya free from sanitation and hygiene related diseases and seeks to ensure universal access to improved sanitation, clean and healthy environment by 2030

Relevance

The Contractor shall need to abide by this provision and ensure proper hygiene is observed on site.

5.3.11 Water (Harvesting and Storage) Regulations

Dictates structural standards and climate change mitigations for public/private waterworks, storage reservoirs, and run-

off controls to manage potential airport flooding hazards

Relevance –The proponent will adhere with provision of this act

5.4 International Regulations

Projects funded by Agence Française de Développement (AFD) contribute to France's ODA strategy, the implementation of the 2030 global agenda and the 17 Sustainable Development Goals (SDGs). In the context of the follow-up to the 2005 Paris Declaration on Aid Effectiveness and in line with the 2014 Law on the Orientation and Programming Development Policy and International Solidarity, AFD has decided to harmonize the principles of the current Environmental and Social Risk Management Policy and to coordinate its actions with the environmental and social framework of multilateral donors. AFD has therefore aligned its Policy with the World Bank's environmental and social standards for projects with High or Substantial environmental and social impacts.

The following ESS will be triggered by the proposed project:

5.4.1 Environmental and Social Standard1: Assessment and Management of Environmental and Social Risks and Impacts;

ESS1 sets out the Borrower's responsibilities for assessing, managing and monitoring environmental and social risks and impacts associated with each stage of a project supported by the Bank through Investment Project Financing, to achieve environmental and social outcomes consistent with the Environmental and Social Standards (ESSs). WB classifies its projects into four Environmental and Social Assessment categories according to the likely impacts on the environment and community they will have. This classification is as summarized below:

- a) High Risk: The Project is likely to have adverse social impacts significant in terms of scale or irremediable character, or certain social groups are likely to be disproportionately affected. High Risk Projects are generally more complex than substantial risk projects.
- b) Substantial Risk: The Project may have adverse social impacts significant in terms of scale or irremediable character, or certain social groups may be disproportionately affected. The risk of a substantial risk project maybe large to medium, while the location maybe in a highly sensitive area.
- c) Moderate Risk: The Project does not pose risk of adverse social impacts significant in terms of scale or irremediable character. The Project may have adverse social impacts, but feasible, appropriate and sufficient avoidance and minimization measures can readily be designed and implemented to prevent these. The impacts which cannot be avoided through design alternatives would be readily remediable if they were to occur.
- d) Low Risk: The Project poses little or no risk of adverse social impacts or adverse impacts on the realization of human rights.

Relevance - The proposed Project is categorized as a Low Risk and thus prompting this Summary Project Report

5.4.2 Environmental and Social Standard 2: Labor and Working Conditions;

This standard recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental 1 right of workers. For any business,

the workforce is an asset, and a sound worker-management relationship is a key ingredient in the sustainability of a company. Failure to establish and foster a sound worker-management relationship can undermine worker commitment and retention and can jeopardize a project.

Relevance - The proposed Project will involve hiring of skilled, semi-skilled and non-skilled workers. Workers welfare and human dignity should be respected during the project implementation period and ensure fairness during recruitment

5.4.3 Environmental and Social Standard 3: Resource Efficiency and Pollution Prevention and Management;

Recognizes that economic activity and urbanization often generate pollution to air, water, and land, and consume finite resources that may threaten people, ecosystem services and the environment at the local, regional, and global levels. This ESS sets out the requirements to address resource efficiency and pollution prevention and management throughout the project life-cycle.

Relevance- The project team and Contractor will prepare a waste management plan and a licensed waste handler will be engaged for proper disposal of waste

5.4.4 Environmental and Social Standard 4: Community Health and Safety;

Addresses the health, safety, and security risks and impacts on project-affected communities and the corresponding responsibility of Borrowers to avoid or minimize such risks and impacts, with particular attention to people who, because of their circumstances, may be vulnerable.

Relevance- There will be an Occupational Safety and Health will be prepared for the identification and development of mitigation measures. Awareness and sensitization will also be conducted.

5.4.5 Environmental and Social Standard 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement;

Involuntary resettlement should be avoided. Where involuntary resettlement is unavoidable, it will be minimized and appropriate measures to mitigate adverse impacts on displaced persons (and on host communities receiving displaced persons) will be carefully planned and implemented.

Relevance – There is likelihood of damage to business structure and disturbances and a livelihood restoration plan (LRP) and resettlement action Plan (RAP) report has been prepared separately.

5.4.6 Environmental and Social Standard 8: Cultural Heritage;

Recognizes that cultural heritage provides continuity in tangible and intangible forms between the past, present and future. ESS8 sets out measures designed to protect cultural heritage throughout the project life-cycle.

Relevance-The Contractor will adhere to the set-out regulation and will adopt the find chance procedure in case of the identification of cultural artefacts and heritages.

5.4.7 Environmental and Social Standard 10: Stake holder Engagement and Information Disclosure

Recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.

Relevance-Stakeholder engagement has been conducted and will continue throughout the project period.

5.5 International Conventions and Treaties Ratified by Kenya

Kenya has ratified several international conventions pertinent to land administration, environmental protection and human rights. Some of these conventions are:

Table 5-1: International treaties

Treaty	Relevance
• The Paris Agreement of 2016 at the UN Climate Change Conference (COP21) in Paris on December 12, 2015 Convention on Global Warming;	• The project will incorporate climate resilience in its design and project activities
• Convention Concerning the Protection of the World Cultural and National Heritage (World Heritage Convention), Paris, 1975;	• The project will adhere to the regulations and adopt the chance find procedure in case cultural and heritage artifacts
• Montreal Protocol on Substances that Deplete the Ozone Layer Vienna Convention on the Ozone Layer 1985;	• The project will adopt technologies and materials that are ozone friendly.

CHAPTER 6: STAKEHOLDER CONSULTATIONS AND PUBLIC PARTICIPATION

6.1 Introduction

Consultative Public Participation (CPP) as an ESIA procedure is an aid to project management. It is a useful tool for gathering local environmental information by understanding anticipated impacts from local people who have lived and understand their environment better. Consultation also gives a chance to the local community to participate in the determination of project alternatives regarding designing and citing viable and sustainable mitigation and compensation plans. The consultation is best commenced during the project design and continued throughout all other project phases as the requirement stated in EMCA (Amendment) Act 2015 and EIA/EA (amendments) Regulations, 2019.

The objectives of public consultations were to:

- informing the public and relevant stakeholders regarding the project
- Improved Decision-Making from gathering diverse perspectives from the stakeholders:
- Increased stakeholder support during development and after completion:
- Enhanced Project acceptance and sustainability:
- Early stakeholder engagement allows for the identification and mitigation of potential risks and challenges before they escalate into significant problems.
- Improving transparency and accountability in decision making
- Diverse stakeholder perspectives can spark innovative ideas and solutions that may not have been considered otherwise.
- Managing the community and stakeholder's expectations regarding the project
- Obtaining local knowledge regarding the project sites

6.2 Stakeholder Mapping

The identification of stakeholders for this Project followed the procedures outlined in the Environmental Management and Coordination (Amendment) Act 2015, Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019 Guidelines, the Constitution of Kenya 2010. To meet best practice approaches, the following principles were applied for stakeholder engagement:

- Openness and life-cycle approach
- Informed participation and feedback
- Inclusiveness and sensitivity:
- Cultural appropriateness.
- Gender sensitivity.

The key stakeholder groups identified, consulted and informed about the project are presented in **Table 6-1**.

Table 6-1: Target Stakeholder Inventory

No.	Name	Category
Primary Stakeholders		
1.	Mavoko Water and Sewerage Company Ltd (NCWSC)	Water Service Provider

2.	National Government Administrative Office Deputy County Commissioners (DCC), Chiefs/ Assistant chiefs	National Government
3.	Machakos County Government, Environmental office Minister of water	County Government
4.	Public Health Officer	National Government
5.	Village Elders	Community Representatives
6.	Area Residents	Community
7.	Community Groups	Community
8.	JKIA representative	National Government
9.	Embakasi Garrison representative	National Government
Secondary Stakeholders		
1.	County/sub county NEMA office	National/County Government Agencies and Ministries
2.	Physical Planning Officer	
3.	Sub-county Lands Registrar	

6.3 Stakeholder Consultation Activities

Public consultation is useful for gathering environmental data, understanding likely impacts, determining community and individual preferences, selecting project alternatives, and designing viable and sustainable mitigation, compensation plans and restoration plan. The consultations will take place throughout the planning phase and continue during the construction and operational phases of the project.

Table 6-2 presents an overview of the stakeholder activities that were undertaken during the stakeholder engagement

Table 6-2: Stakeholder Consultation Activities

Phase	Activities
Phase 1: Stakeholder identification and preliminary consultation/scoping	- Stakeholder identification and categorization during the Project inception exercise - Preliminary consultation: liaison with National, County, and Local Institutions - Identification of key Project constraints
Phase 2: Information distribution and introductory Meetings	- Distribution of specialists and technical Information to the County Government administration, and other relevant stakeholders - Introductory meetings with local administration, Sub-Counties administrators and ward administrators, and relevant authorities.

Phase	Activities
Phase 3: Impact Identification and Development of Mitigation Measures	• Meetings with Local Administration in affected locations • Meetings and conducting Key Informant Interviews with members of sub-county and Ward administrators within the settlement • Conducting interviews with the community members • Dialogue and meetings with the above-identified stakeholders
Phase 4: Disclosure of the draft EIA	• Submission of ESIA Project Report to National Environment and Management Authority (NEMA) • Circulation of Project Report by NEMA to relevant Lead Agencies • Review and Incorporation of Lead Agencies' comments and revisions to ESIA • Collection and incorporation of comments and feedback. • Issuance of license
Phase 6: consultation during construction and operation	• Throughout the Project

6.4 Stakeholder Consultation

The main key informants targeted in the consultations were both Government and private institutions operating within the project area. Listening to stakeholder concerns and feedback is a valuable source of information that can improve project design and outcomes and help in identifying any impacts.

6.4.1 Key Informant Consultations

Consultations and structured questionnaires were administered to the key stakeholders in the month of September 2025 to solicit views regarding the project as well as its design. The consultations and questionnaires were administered through visiting the various key stakeholder's offices and a brief discussion regarding the project. The questionnaires initially gave introduction and created awareness to the respondents regarding the project. Afterwards, questionnaire enquired on acceptance of the project, rating of the current water supply and sanitation conditions, anticipated positive and negative impacts, suggested mitigation measures as well as any suggestions and recommendations. Sample questionnaires have been attached in **Annex 5** of this report. In total 11 key stakeholders were consulted constituting 3 females and 8 males. The summary of the Key stakeholders input is presented in Table 6-3: Key Stakeholders consulted

Name	Gender	Designation
James Gitonga	Male	Administration Syokimau County Government
Mohamed Ismai	Male	Syokimau Residents Association Chairman
Philip Mango	Male	Ass. Syokimau Residents Association
David K. Muthuka	Male	Ass. Chief Syokimau area
Shem N. Olumula	Male	Syokimau Youths Association

Denis Munene	Male	Operations Manager MAVWASCO
Jane Mbithi	Female	Chief Katani area
Jacky	Female	Machakos County Department of Water, Irrigation, Environment Climate Change & Natural Resources
Sally Sammy	Male	
William Makau	Male	
Nancy Ndegwa	Female	Assistant County Commissioner
Eng. Meshack Ochieng	Male	GM - PES

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Table 6-4 below:

Table 6-3: Key Stakeholders consulted

Name	Gender	Designation
James Gitonga	Male	Administration Syokimau County Government
Mohamed Ismai	Male	Syokimau Residents Association Chairman
Philip Mango	Male	Ass. Syokimau Residents Association
David K. Muthuka	Male	Ass. Chief Syokimau area
Shem N. Olumula	Male	Syokimau Youths Association
Denis Munene	Male	Operations Manager MAVWASCO
Jane Mbithi	Female	Chief Katani area
Jacky	Female	Machakos County Department of Water, Irrigation, Environment Climate Change & Natural Resources
Sally Sammy	Male	
William Makau	Male	
Nancy Ndegwa	Female	Assistant County Commissioner
Eng. Meshack Ochieng	Male	GM - PES

Table 6-4: Summary of the Key Stakeholder consultation

Key Informant	Positive impacts identified	Negative impacts identified	Proposed mitigation measures
	During Construction, During operation and maintenance	During construction, During operation and Maintenance	
Administration Syokimau County Government	Community involvement which may lead to improved security	Obstruction of some gate and business entrances during construction and maintenance.	Ensure safe temporary access to homes and businesses at all times Install clear signage and barriers around works, Develop a traffic management plan. Notify the affected person on the anticipated obstructing before commencement of any activity.
Syokimau Residents Association Chairman	Provision of clean and safe water to the residents	None	
Ass. Syokimau Residents Association	Availability of clean and safe water. Improved health and long life.	Interruption of traffic flow especially at gate entrances to the main courts.	Ensure safe provision of alternative routes to access to homes and businesses at all times Install clear signage and barriers around works, Develop a traffic management plan.
Ass. Chief Syokimau Area	Adequate water supply for the community	Traffic congestion and inconvenience of transport during construction/excavation works.	Properly and timely notification/communication to the residents Schedule heavy material deliveries, and excavation works during weekends to minimize impacts on daily commuters. Avoid the overlap of activities and material deliveries to reduce congestion Deploy traffic marshal to manage traffic
Syokimau Youths Association	Youth employment and empowerment. Availability of clean and safe water. Improved sanitation.	Demolition of existing infrastructure which include paved roads, gates, verandahs etc.	Timely reinstatement of affected areas. Tree planting Installing netting to contain dust and prevent it from spreading to nearby residential or commercial areas.
Operations Manager MAVWASCO	Creation of employment opportunities for the locals. Creation of business opportunities. Access to more clean and safe water	Destruction of properties. Air and Noise pollution	Continuous public engagement throughout the project. Implementation of environmental control measures

Key Informant	Positive impacts identified	Negative impacts identified	Proposed mitigation measures
	During Construction, During operation and maintenance	During construction, During operation and Maintenance	
			Restricting loud demolition activities to daytime hours to minimize disruption to neighbors. Installing netting to contain dust and prevent it from spreading to nearby residential or commercial areas. Ensuring all debris transportation trucks are covered to prevent spillage and dust during transport off-site
Chief Katani area	Availability of clean and safe water	Delay of completion of the project	Fasten the process of project implementation.
Machakos County Department of Water, Irrigation, Environment Climate Change & Natural Resources	Improved water supply within the project area. Improved sanitation. Improved economic status of people Creation of job opportunities for the youth. Improved health for the residents.	Relocation of businesses and persons along the wayleave. Disruption of existing water network. Waste generation. Air/Dust pollution Injuries for workers during construction.	Proper waste disposal. Watering of the excavated areas to prevent dust generation. Employment of qualified first aiders during construction. RAP to guide relocation process if encountered
Assistant County Commissioner	Improved health due to availability of quality, clean and safe water. Improved Sanitation and economic status of the residents.	Negative health related impacts due project activities. Disruption of the existing services and normal human activities	Continuous community engagement. Implementation of the identified mitigation measures.
Embakasi Garrison administration officer	Improved access to clean water supply in Garrison.	Anticipated destruction of vegetation	Replant more in case trees if impacted

6.5 Public Consultation

Public sensitization meetings were held within the project area in September and October, 2025 with the help of the respective local administration more so the area chiefs and assistant chiefs. A total of 3 meetings were held as shown in Table 6-5 below. The attendance lists and minutes of meetings are presented in Annex 3. Interviews using standard questionnaires were also conducted, sample filled questionnaires are part of this report (Annex 4)

Table 6-5: Public participation meeting schedule

No	Date	Venue	Location	No of participants		Total
				Male	Female	
4.	1.10.2025	Chief's office ground	Syokimau	39	8	47
5.	2.10.2025	Orynx Petrol Station-Katani	Katani	20	8	28
6.	24/10/2025	Mlolongo Chiefs Camp	Mlolongo	36	13	49
			Total	95	29	124

6.6 Summary of Comments from Public Sensitization Meetings

Table 6-6: Summary of comment and responses from the public meeting

Project Area	Concern	Responses
Katani	Katani residents Association Chairman 1. When will the project start?	The Consultant informed participants that the project commencement is contingent upon the approval of the Environmental and Social Impact Assessment (ESIA) and the Resettlement Action Plan (RAP) reports, as well as the completion of the final engineering designs. Once these prerequisites are fulfilled, there will be no further impediments to the start of project implementation. The community was assured that all preparatory activities are progressing according to schedule to ensure a timely start.

	Makati Zachary- 1. What are the probable timelines we are talking about? 2. The proposed lines in Katani appear fewer compared to Syokimau, yet both areas have a similar population density.	The Consultant clarified that specific implementation timelines will be communicated upon completion of the design review and receipt of all statutory approvals. Regarding the network layout, the design team will reassess the proposed line distribution to ensure equitable coverage across Katani, taking into consideration the area's high population density and anticipated water demand. The input provided by residents will inform future design adjustments.
	Castina- 1. The design appears to focus mainly on major roads rather than feeder roads. Is there provision for more lines? 2. Katani's population is significantly higher compared to Syokimau, thus requiring additional water lines.	The Consultant explained that the current design phase prioritizes primary distribution lines along major roads to establish the backbone of the network. However, provisions have been made for future extensions to feeder roads once funding and technical conditions allow. The concerns regarding high population density and the need for wider distribution coverage will be communicated to the design and planning teams for review and possible inclusion in the project's subsequent phases.

	Kaloki 1. The Consultant mentioned that the current ENP project is ongoing and that a contractor is already in place. Could you clarify the timelines? 2. How will MAVWASCO distribute water in such a vast area? 3. Will project implementers work with KURA to identify utilities along the roads?	The Consultant confirmed that once the final design phase is completed, the project implementation schedule would be shared with stakeholders. MAVWASCO will manage water distribution through its existing operational structures and planned community connection frameworks to ensure equitable access. Coordination with the Kenya Urban Roads Authority (KURA) and other utility service providers will be undertaken during implementation to map existing infrastructure, prevent service disruption, and ensure effective utility management along the road corridors.
	Community Elder; 1. How will you handle potential interference from existing borehole water suppliers in the area, and how will you coexist with them? 2. Will there be any compensation for affected persons? 3. We request that local youth be employed once the project begins	The Consultant explained that the project aims to complement, not compete with, existing borehole suppliers. Coexistence will be achieved through continuous stakeholder engagement and open communication to ensure mutual understanding and minimal conflict. The Consultant also clarified that compensation will be guided by the RAP. Regarding employment, the Consultant emphasized that local youth participation is a priority. During implementation, the contractor's sociologist will collaborate with community leaders to identify and recruit qualified local youths, especially for unskilled and semi-skilled roles.

	Wekesa; 1. During actual piping, if you encounter encroachments, how do you normally handle the situation?	The Consultant assured stakeholders that any encroachments identified along the project alignment will be managed in accordance with the approved RAP procedures. This involves engaging the affected persons, documenting the cases, and coordinating with local authorities to ensure amicable and lawful resolution before construction proceeds.
	Jane Mbithi; 1. What about sewer services? The area is in dire need of a sewer system. Are there any plans for this? 2. If the project requires an additional pressure tank, we have public land at the House of God Church that can be made available.	The MAVWASCO representative clarified that a sewer design for the Katani area has already been developed; however, implementation is pending due to ongoing efforts to secure financing. The Consultant committed to forwarding this concern to the ENP Project Team to explore whether sewer works could be integrated within the current project scope or future phases. Additionally, the generous offer of public land at the House of God Church for potential installation of a pressure tank will be communicated to the design team for technical evaluation and consideration if additional infrastructure becomes necessary.
	KSA Secretary; 1. The proposed main line terminates at Same Road, which connects to Utawala Airways. Could a connection be made to the Utawala line to improve service coverage?	The Consultant acknowledged the suggestion and confirmed that the design team will review the feasibility of interconnecting with the existing Utawala network. The input will be documented for consideration during the detailed design optimization process.

Syokimau	A community member reported that the water supply to the area, which was previously available, had stopped and was requesting an explanation	MAVWASCO Representative informed the meeting that there was a condition assessment which was conducted and it identified that some pipes had been damaged and even joints stollen and hence this was the course also water was scarce. Currently, the Syokimau area requires water to be pumped from downstream because of its upstream location. We are now discussing a more permanent solution with AWWDA: to supply Syokimau with water from the new dams being built to supply water to Nairobi, since it is part of the Nairobi Metropolitan area.
	Community members wanted to know who shall incur the cost of constructing or laying service/feeder lines once AWWDA has completed laying primary lines.	The MAVWASCO representative indicated that funding for this initiative is still under discussion. In response, several community members expressed a willingness to contribute financially to the project once the primary water lines are installed and operational.
	The community representatives wanted to know when shall the project start.	The consultant confirmed that upon approval of the ESIA and RAP reports and completion of the final designs, there will be no further impediments to the project's commencement.
	The community members had a concern if the water pressure shall be able to reach the furthest points	The MAVWASCO representative assured the meeting that water supply and pressure would be sufficient. The primary concern, he noted, is the risk of pipe damage preventing delivery to end-users. He therefore urged the community to uphold its role in protecting the infrastructure through community policing.
	One of the community members wanted to know what did OD mean in the provided map	MAVWASCO Representative clarified this by saying that OD means Outside Diameter of the pipe to be laid.

	Community members inquired about the sanitation plan for the area, emphasizing that it should be a concurrent concern alongside the planned water supply.	The MAVWASCO representative informed the meeting that project proposals, including detailed designs, have been prepared and that the agency is now actively soliciting funds.
	The community members expressed a desire for the quarry line to be extended.	The team confirmed that this shall be considered in the final design.
	The community members wanted to know who will be the Contractor for the project and how well prepared is he.	The Consultant Representative confirmed that there is a contractor who is still undertaking other works under the Eastern Nairobi Water and Sewer Intensification Project.
	The community members expressed that a majority of the project's workforce should be sourced locally.	The Consultant Representative confirmed that this plan is the optimal strategy to prevent conflicts.
Mlolongo	Several participants asked whether local residents would be given priority in employment during the construction of the pipeline.	The consultant and project representatives assured the community that the contractor would prioritize hiring workers from within the local area for available positions, particularly for unskilled and semi-skilled tasks. This approach would not only support local livelihoods but also promote community ownership of the project.

	Community members also inquired about how and when the water would be available to residents once the pipeline construction is completed.	The project team responded that, if all activities proceed as planned and no major delays or complications occur, water distribution is expected to begin in December. Once the pipeline is fully installed and tested, residents will be able to access water through proper connection channels. The representatives from the water distribution agency clarified that residents who wish to have individual household water connections will be required to apply for service after the completion of the pipeline.
	Suggestion & comments	Appreciated being informed and involved in the project. Raised concerns about dust, noise, and road access during construction, which were then referred back to the ESIA. Traders asked for advance notice before works begin near their stalls. Sought clarification on water connection fees and application procedures. Requested regular updates and communication during the project. Expressed overall support for the project if implemented fairly and transparently



The Chief making introductions and welcoming the meeting attendees.



Members expressing their approval for the proposed project by a show of hands.



One of the community Members asking a question during the Q&A Session.



Members expressing their approval for the proposed project by a show of hands.

Figure 6-1: Sample photographs taken during the meetings

CHAPTER 7: ASSESSMENT OF IMPACTS AND MITIGATION MEASURES

7.1 Introduction

This ESIA assessment has been systematically conducted to determine whether the proposed Project will have a diverse impact on the environment. The Environmental Management and Co-Ordination Act (EMCA) No.8 of 2015 provide the legal and statutory guideline for the Environment and Social Impact Assessment process in Kenya.

The impacts in this Chapter have been generated based on the analysis of the proposed environment in relation to the proposed project. The impacts have been segregated in three main phases: Pre-Construction Phase, Construction Phase, Operation Phase and Decommissioning Phase. Impacts can be categorized into:

- Impacts on biophysical environment;
- Health and safety impacts
- Social-economic impacts

7.2 Definition and Classification of Environmental Impact

An environmental or social impact is any change to the existing condition of the environment caused by human activity or an external influence. Impacts may be:

- Positive (beneficial) or negative (adverse);
- Direct or indirect, long-term or short-term in duration, and widespread or local in the extent of their effect.

7.3 Impact Significance

The purpose of this ESIA SPR is to identify the significant impacts related to the project under consideration and then to determine the appropriate means to avoid or mitigate those which are negative. Significant impacts are defined, not necessarily in order of importance, as being those which:

- Area of public concern and importance.
- Trigger subsequent secondary impacts.
- Elevate the risk to life threatening circumstances.
- Affect sensitive environmental factors and parameters.

7.4 Impact Scoring and Rating Criteria

Impacts were identified according to their significance determined by consideration of project activity event, magnitude and receptor sensitivity. The expected significance of environmental impacts was assessed considering to the extent, timing, intensity and probability of occurrence. Receptor sensitivity rating was done in terms of presence and resilience. Where there is uncertainty or insufficient information the Precautionary principle was used to establish the significance of impacts and their management and mitigation.

7.5 Machinery to be used on site their Impacts and Mitigation measures

The following machines are likely to be used during construction of the proposed project. They include but not limited to; Butt fusion machines, backhoe, hand tools such as (striking tools like hammers, gripping and holding tools like wrenches, pliers, and digging tools like jembes, hoes, shovels and spade) concrete mixers, generators, and

compactors. There may be minimal use of heavy machinery due to limited space. The table below shows their impacts and mitigation measures

Table 7-1: Machinery to be used on site their impacts and mitigation measure

Machinery	Uses	Potential Impacts	Mitigation Measures
Compactors	Used for compacting loose soils	Noise and vibration pollution	• Use vibration-dampening equipment such as silencers/mufflers • Workers to be issued with earmuffs • Schedule works and communicate prior to the community to minimize disruptions and avoid inconveniences to residents
		Hand-arm vibration syndrome	• Train workers and implement job rotation
		Trips and falls from the wires and during operation	• The Contractor to ensure there is adequate space where plate compactors will be used • Maintain a firm grip on the handles and keep a stable stance to manage vibrations effectively.
Concrete Mixers	Used for mixing Sand, Cement, Ballast and water	Dust and particulate pollution	• Use enclosed mixing areas • Workers to be issued with dust masks and heavy-duty gloves
		Soil pollution from cleaning of machines	• Avail the machine to existing carwash or service station for cleaning
		Risk of spills and wastage	• Construct a portable impermeable platform to be used for collection any excessive concrete mix. • Provide spill kits for machines like generators

Machinery	Uses	Potential Impacts	Mitigation Measures
Concrete Vibrator	Used for intense vibrations to compact concrete, ensuring a strong, durable, and smooth finish	Noise and vibration pollution	• Use vibration-dampening equipment such as silencers/mufflers • Workers to be issued with earmuffs and hard gloves • Schedule work to minimize disruptions • Construction noise should not exceed 90 dB (A) during the day as per the Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.
Diesel Generators	Used for generating back-up power	Air pollution from emissions	• Use energy-efficient generators • Workers to be issued with masks
		Noise pollution	• Enclose generators to reduce noise • Workers to be issued with earmuffs/ear plugs
Hand tools such as (striking tools like hammers, gripping and holding tools like wrenches, pliers, and digging tools like jembes, hoes, shovels and spade)	Used for digging, breaking soft rocks, mixing and scooping and other masonry works	Ergonomic injuries	• Use safe and well-maintained tools • Broken tools should be replaced • Provision of appropriate gloves when using the tools • Proper housekeeping and storage of the tools • Provision of adequate first aid kit on site • Sensitization of workers on safe use of tools • Provision of appropriate PPEs i.e. hand heavy duty gloves and safety shoes
Butt fusion Machine	Used for Joining HDPE Pipes	Lead to Skin burns and cuts	• Provision of appropriate PPEs i.e. hand heavy duty gloves and safety shoes

Machinery	Uses	Potential Impacts	Mitigation Measures
		Noise pollution	- Workers to be issued with earmuffs - Construction noise should not exceed 60 dB (A) during the day as per the Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009
		Waste generation from pipe strips	The waste should be disposed at the designated waste bin for collection and disposal by a licensed NEMA waste handler
Backhoe	Excavation works	Noise pollution	- Workers to be issued with earmuffs - Construction noise should not exceed 60 dB (A) during the day as per the Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009
		Oil spills	Proper maintenance and regular servicing at available fuelling/servicing stations
All the tools and equipment	Activities listed above	Machine failure and accidents	- Proper maintenance. - Operation by qualified staff only. - Inspection by a licensed government inspector

7.6 Pre-construction phase

7.6.1 Positive impacts

7.6.1.1 Documentation and publicity

The project area will benefit significantly in terms of the intensive information gathering during the pre-project feasibility study and the pre-project EIA which will generate useful reports that will create important reference points for the area both for scientific research and planning activities.

7.6.1.2 Employment

Employment opportunities will be created in the construction of camp sites by the contractor

7.6.2 Negative impacts

7.6.2.1 Temporary land interference

The Proposed Water Supply Project in Syokimau, Mlolongo, Katani, Embakasi Garrison, JKIA and surrounding environs is likely to cause temporary land interference during access to site and on the project area where laying of a new 45 km of pipe and installation of necessary fittings is to be undertaken.

Mitigation Measures:

- Notify community members on any new accesses to be created
- Reinstatement to be done after completion of the project
- Mark the lines to avoid conflicts with other activities
- RAP to guide compensation for any assets that will be affected in the course of implementing the project

7.6.2.2 Influx of workers from other areas

The project area might experience an influx of construction workers from other areas who will come to seek for job opportunities.

Mitigation Measures:

- Effective community engagement and strong grievance mechanisms on matters related to labour

7.7 Construction Phase

7.7.1 Positive impacts

The following are the positive impacts during the construction phase of the proposed Project:

7.7.1.1 Employment opportunities

The Project shall create job opportunities for both skilled and unskilled workers such as casual labourers, plumbers, operators, electricians, welders and engineers who shall be engaged on-site for a specific duration. The workers are expected to gain skills and knowledge that they will use after the completion of the project to earn a living. The income gained from the job opportunities will improve the residents' standards of living.

7.7.1.2 Creation of a market for construction materials

The project will require materials, some of which will be sourced locally and some internationally. These include plant steel and plastic pipes, valves, cement, sand, hardcore and chemicals. This will provide a ready market for suppliers in and outside the project area.

7.7.1.3 Increased local incomes

The local community may get extra income from the sale of construction materials from their firms and also renting spaces for camp sites

7.7.1.4 Economic growth

Through the use of locally available materials during the construction phase for example pipes and others; the project will

contribute towards growth of the country's economy by contributing to the gross domestic product. The consumption of these materials, oil, fuel and others will attract taxes

7.7.1.5 Injection of money into the local economy

A large sum of the project money shall be released into the local economy due to the construction activities. It is envisaged that during construction a large number of activities shall take place including but not limited to the following listed below;

- Payments for skilled and unskilled labour;
- Purchases of construction materials; and
- Payments for local provisions including fuel, foods and accommodation

7.7.2 Negative impacts

7.7.2.1 Noise & vibration

The site preparation and construction phases of the development may likely have the most negative impact to the ambient noise and vibration in the development area. A number of measures may be undertaken by the Contractors to reduce the impact of noise on the existing and potential residents as well as the workers involved in the project. This is temporary, however, and the aim at this point is to make the increase in noise minimal as possible until this phase is complete. The cumulative impact of the construction activities occurring simultaneously may increase the noise and vibration levels in the area significantly.

Mitigation Measures:

- Prior communication to the school board and management before constructions works should be made especially where construction activities will be taking place along the schools as presented under sensitive receptors
- Early notifications should be made to institutions and businesses (listed in **Error! Reference source not found.**) prior the commencement of works within their area. This is to inform them they may experience some disruptions for few days during construction. Notification is a form of courtesy and will reduce conflicts and disagreements between the community and the project team.
- Construction noise should not exceed 60 dB (A) during the day as per the Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.
- Machinery, vehicles and instruments that emit high levels of noise shall be used at intervals and the workers shall work interchangeably to reduce the overall impact and exposure time. These pieces of equipment such as concrete vibrator, compressors, plate compactors and cement mixers etc. (listed in Table 3-8) should also be used when the least number of residents can be expected to be affected, for example during periods where most residents are at work, school, weekends or holidays
- Establish channels for feedback and addressing of concerns raised by stakeholders promptly.
- Conduct quarterly assessments of noise levels to ensure they remain within acceptable limits. These assessments shall be done by an external health and safety expert.
- Provision of appropriate personnel protective equipment to the workers such as ear muffs and plugs.
- Conducting medical examinations (audiometry) by a Designated Health Practitioner for workers exposed to prolonged high noise levels

7.7.2.2 Dust Emissions

Dust will be emitted during excavation and related earthworks. Air borne particulate matter pollution is likely to occur during the route clearance, excavation and during the transport of construction materials. This is likely to affect site workers and the residents, in extreme situations leading to respiratory problems.

Mitigation Measures:

- Regularly dust suppression through watering should be done on exposed surfaces, particularly during dry conditions.
- Strict protocols should be enforced for handling construction materials in powder form, such as covering of cement and sand during transportation.
- Provision of PPE e.g. dust masks to workers.
- Reinstatement of disturbed areas once construction is completed.
- Minimizing the number of motorized vehicles in use on site.
- Conducting workers medical examinations (Pulmonary Function Test (PFT) or Spirometry) by a Designated Health Practitioner for especially for workers exposed to cement and dust.

7.7.2.3 Soil Pollution

Soil quality degradation is also likely to occur during construction because of spills from cement during concrete works and oil spills and even construction waste.

Mitigation Measures

- A portable impermeable surface such as concrete platform should be used to prevent concrete spillage onto soil during concrete works done within the project site.
- In case of spilled cement or concrete should be collected and disposed by the licensed waste handler to a NEMA waste collection site.
- During cement mixing, water management should be key to reduce runoff and unnecessary water wastages.
- Use of water sprays or dust suppression equipment around cement mixing areas will minimize airborne particles that could settle on soil causing pollution.

7.7.2.4 Solid Waste Generation

Solid waste generated during construction include papers used for packing, plastics, cuttings and trimmings off materials among others. Dumping around the site will interfere with the aesthetic status on the surrounding environment. This impact is short term. However, the disposal mechanism of the waste can have long term consequences. It is expected that the contractor should ensure full compliance with the EMCA Waste Management Regulations of 2006 as well as the following measures: -

Mitigation measures

- All solid waste will be collected at a central location designated by the Contractor preferably at the campsite and on project site, using clearly labelled and color-coded containers. It will be stored temporarily until it is moved to a NEMA-approved disposal site, handled by a licensed waste collector as

per the Waste Management Regulations, 2006.

- Wherever possible, the Contractor should reuse and recycle waste generated on site.
- All personnel assigned to collect waste on site shall be provided with appropriate PPEs i.e. heavy-duty gloves, protective footwear, dust masks and aprons.
- A comprehensive site waste management plan shall be prepared by the Contractor prior to commencement of construction works. This should include designation of appropriate waste storage and segregation areas, collection and removal schedule and identification of approved disposal site by NEMA.
- The Contractor shall ensure workers are sensitized on proper waste management methods on site during construction.
- Construction of standards septic tank and timely exhaustion of waste when it is full to avoid spill offs.

7.7.2.5 Site Related Oil Spills

During construction, oil spills may result from construction site equipment, which may affect the, soils, and surface as well as underground water ways in the area after being swept by rainwater and seep into the soil.

Mitigation Measures

- The Contractor should ensure that the employees on site are aware of the procedures for dealing with spills and leaks through induction, toolbox talks and safety trainings (the Contractor's EHSS shall propose a method of clean-up which shall be subject to approval);
- All vehicles and equipment should be kept in good working conditions and serviced regularly in service stations and fueling stations selected by the Contractor
- The Contractor to ensure spill kits are provided at the construction sites for machines like generators promoting efficient response to spills, minimizing environmental impact and ensuring workers' safety.
- Ensure fuels, oils, and lubricants are clearly labelled and stored in impermeable containers away from surface drains.

7.7.2.6 Impacts on Vegetation

Vegetation loss is expected to occur during site preparation. Clearing of vegetation such as grass and trees may occur along the pipeline proposed route and in areas of chamber installation. The Project team and Contractor to ensure minimal destruction of vegetation and adhering to the marked project site and finding alternatives wherever possible. The risk of destruction of vegetation in the project areas is low and will be further minimized by limiting Site clearance and construction activities within the delineated construction work area.

Mitigation Measures

- Reinstatement of the project sites after completion of works
- The Contractor to adhere to the delineated construction work area.
- Planting of grass and trees in sites identified within the project area preferably schools, institutions where they can be secure and well maintained.

7.7.3 Occupational Safety and Health impacts

7.7.3.1 Worker's Welfare

Due to the adverse project activities, there will be an influx of workers within the project area. A lot of workers will also be engaged in the construction activities. It is essential to ensure the workers' welfare needs are met on site

Clean drinking water is an essential component during construction works. Workers should be able to have access to clean and adequate drinking water to prevent situations such as dehydrations. Workers will likely experience fatigue on site especially during hot days. The workers should also be able to take rests and have access to resting areas to prevent situations such as fainting and heat strokes. Clean and adequate gender segregated sanitation facilities will also be a requirement to cater for the welfare of workers and the project team

Mitigation measures

- Conducting workers pre-employment and periodic medical examinations by a Designated Health Practitioner. This will include general medical examinations, specialized tests depending on the workers job description such as Pulmonary Function Test (PFT) or Spirometry for workers exposed to cement and dust, audiometry amongst others as prescribed in the OSHA Act 2007, Medical Examination Rules, 2005 and Legal Notice No. 50 of 2022.
- Provision of Labelled toilet facilities at a minimum ratio of Toilet per 30 workers (preferred 1:15) and the exact location of the toilets shall be approved by the Public Health Department prior to establishment.
- The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from site to an approved disposal site.
- Provision of adequate clean drinking water and drinking vessels should be made available on site.
 - Provision of adequate resting areas and gender segregated changing station away from machinery for the workers to be accessed during breaks.

7.7.3.2 Community Welfare

Open trenches, equipment movement, diversions, and night works expose communities to hazards. Vulnerable groups such as children, the elderly, and disabled individuals face risks of falling into trenches or colliding with vehicles. Poor fencing and inadequate lighting exacerbate these dangers. Community grievances are likely if safety measures are not visible and effective. Accidents involving community members could severely damage the project's reputation and trigger demands colliding with vehicles.

Mitigation Measures

- Clearly post warning signs indicating the presence of construction activities and potential hazards and communicate construction plans and potential noise impacts to the community prior to construction. This helps reduce conflicts with the community and helps residents plan for their day-to-day activities.
- Community members should be notified before work commences for them to be aware of the ongoing works and take precautions.
- Provision of pedestrian crossing should be done

- Open trenches should be barricaded appropriately

7.7.3.3 Accidents and Injuries and Loss of Life

During construction works such as excavation works, delivery amongst other construction works accidents and injuries are likely to occur on site. In extreme cases, death may occur on site. Common causes of injuries and accidents on sites include slips, falls, and collisions of machineries, cave-ins of trenches, falling objects, ergonomics impacts, and electrical hazards amongst others. If proper safety measures are not put in place, frequent accidents and injuries will occur on site. Creating a culture of safety is crucial to prevent injuries and maintain a healthy, productive site.

Mitigation Measures

- Develop a site Occupational safety action plan detailing safety equipment to be used, emergency procedures, restriction on site, frequency and personnel responsible for safety inspections and controls adhering to guidelines in the OSHA Act 2007
- Developing a health and safety policy to be adhered to by all the project team members
- Conducting Job Safety Analysis and risk assessments before commencing works on new sites.
- Conducting machinery and vehicles inspection on site by a licensed inspector
- All workers should be provided with appropriate PPEs (Overalls, Reflectors, Helmets, dust masks, Steel toe Gum boots and safety shoes, Heavy duty gloves, Goggles for eye protection) to prevent and minimize accidents and injuries. Appropriate PPEs should be provided as established from risk assessment and enforce their usage.
- The workers should receive requisite training especially on the operation of the machinery and equipment from licensed NTSA trainers
- Trainings for the workers during induction and toolbox talks on Occupational Health and Safety, first aid and fire safety.
- Ensuring that the prepared code of conduct for staff is signed and adhered to
- The Contractor shall provide safe means of transportation for workers transported to site daily.
- Trenches should be well secured using warning tape, hard barricades and with appropriate, visible signages.
- Access ladders shall be provided to facilitate movement in and out of the trenches and during masonry works.
- Sensitization shall be done to all workers on safe transportation of materials and penalties for not adhering shall be communicated through inductions and toolbox talks.
- Provide fully equipped First Aid Kits within the construction sites and ensure that at any moment during the works, there is a trained first aider on site. The ratio of trained first aiders to worker will be as per defined by the OSHA First Aid Rules.
- Recording of all accidents, injuries and deaths that occur on site in the incident register, corrective actions for their prevention and investigated as appropriate.

- Contractor should have an up-to-date Work Injury Benefit Act (WIBA) and the Contractors All risk plan and maintain insurance cover that covers all workers throughout the construction period.
- The Contractor to have an agreement with local health facilities for the provision of emergency services
- Community members should be notified before work commences for them to be aware of the ongoing works and trained on the safety measures to be followed.
- Proper maintenance of tools and machineries highlighted in Table 7-1

7.7.3.4 Fire Outbreak

Fire outbreak in the machinery being used is always a risk because there are flammable substances in use. Fire may also be caused by people smoking in non-smoking zones. Depending on the severity, fire can cause loss of life, disability, or property damage. Thus, precautions are necessary.

Mitigation measures

- Label all inflammable materials and store them appropriately
- Provision of adequate firefighting equipment capable of fighting all classes of fire
- Put — ‘No Smoking’ Signs in areas where inflammable are stored and designating smoking zones within the project areas with ash trays.
- Train workers on the use of fire-fighting equipment
- Develop an emergency response plan.
- Establish fire assembly points in every site
- Avail inspected and appropriate fire extinguishers near generator and other flammable materials.
- Employ trained fire marshal in all active sites.

7.7.4 Social Conflicts and Community Risks

7.7.4.1 Removal of Structures and Loss of livelihood

There is a likelihood of displacement of trading activities at the proposed pipeline routes. As structures shall be removed to allow for excavation, pipe laying and backfilling hence displacement shall occur and steps must be taken to minimize the impacts of the demolition of the structures and to provide for the restoration of livelihoods. The proposed project is likely to affect a total of 730 persons, 216 PAPs in Syokimau, 293 PAPs in Mlolongo and 222 PAPs in Katani.

Mitigation Measures to be put in place include:

- Implement RAP/LRP before commencement of civil works at the affected sites. The RAP exercise has been done and a report will be prepared and shared separately.
- Obtaining letters of no objections from relevant stakeholders before implementation of construction
- Limit damage to property by observing construction area limits
- The Contractor and Consultant shall communicate with the owners of the potential structures to be removed that are within the project sites.

7.1.1.1 Liability for Damage to Private Property

During Construction and excavation activities, there may be damage to private property that may not be foreseen.

Mitigation Measures

- The Contractor to promptly repair and reinstate any damages done to private property.
- Limit damage to property by observing construction area limits by clear demarcation.
- The workers should receive requisite training especially on the operation of the machinery and equipment.

7.1.1.2 Crime Incidences

The facilities shall be in high populated area hence the construction sites are prone to have a few incidences of crime including, stealing of construction materials or individual property, drug abuse and alcoholism among others, within and without the construction site.

Mitigation Measures.

- Working with local committees e.g., *Nyumba Kumi* to provide security within the site in addition to the Contractor's own security.
- The Contractor should ensure the proper barricading of the campsite and deploy trained security personnel.
- All workers should sign the code of conduct on site and ensure adherence.
- The Contractor should prepare and implement a security management plan.
- Expelling any employee who persists in any misconduct or lack of care, carries out duties incompetently or negligently, fails to conform to any provisions of the contract, or persists in any conduct which is prejudicial to safety, health, or the protection of the environment.
- Taking all reasonable precautions to prevent unlawful, riotous or disorderly conduct by or amongst the Contractor's personnel, and to preserve peace and protection of persons and property on and near the site.

7.1.1.3 Spread of HIV and AIDS

Construction workers may be exposed to HIV/AIDS and other sexually transmitted diseases during the construction period due to interactions amongst themselves and from workers that may have migrated in the project area.

Mitigation measures

- Develop HIV/AIDS awareness programs or initiatives to target the construction workers, community, institutions and the general members of the community, particularly the youth; with the objective of reducing the risks of exposure and the spread of HIV/AIDS.
- Provide VCT services on site and encourage workers to undergo the same.
- Provision of protective devices such as condoms.
- Maximize hiring skilled and unskilled workers from the local community

7.1.1.4 Impact on Traffic and Difficulty of Access

There are several roads in the settlement. There are roads such as Mwananchi, Kiungani, community, parliament Chady, Quarry Road and other un-named roads and other un-named roads within the project area where the pipelines will be traversing and the project team will use to access the sites. The main impact is on human, vehicular and other motorist road traffic during laying of water lines within the small paths in the settlement and material delivery. Excavation in residential areas shall cause access problems to pedestrians, business and possibly to riders of bicycles, handcarts and motorcycles. Safe worker's transportation should be complied with. Majority of the workforce is expected to come from the respective project sites and will be reporting with their own means to and from site. Road crossing of the pipes is expected and this may involve micro tunneling and excavation of the tarmac road. Mitigation measures should be put in place to reduce the impacts

Mitigation Measures

- Provide accessible diversion routes where possible and communicate to the community in advance.
- Hoarding using safety tapes and hard barricades along the open trenches to avoid accidents.
- Adequate and appropriate warning signs should be placed at potential risk locations and should be visible at night. The signs should be in a language understandable by all.
- The Contractor to expedite construction works to reduce the times where entrances are blocked especially in businesses and home entrances.
- Access by residents should be facilitated by installing appropriate firm temporary bridges across open trenches that should have support handrails.
- The workers should receive requisite training especially on the operation of the machinery and equipment and those undertaking material delivery from licensed NTSA trainers.
- Training workers on traffic management on site and availing trained traffic marshals along roads such as Mwananchi, Kiungani, community, parliament Chady, Quarry road and other un-named roads and other un-named roads within the project area
- Provision of appropriate PPEs and safety measures whenever there are works that may require micro tunneling or deep excavations of the tarmac roads.
- Sensitization shall be done to all workers on safe transportation and penalties for not adhering shall be communicated through inductions and toolbox talks.
- All motor vehicles should be road worthy and properly serviced.
- Drivers should sign codes of conduct.
- The Contractor shall provide safe transportation of the skilled workers to site where need be since workers will be sourced locally. This will be by either contracting a licensed public service transport provider or using own vehicle that meets requirements for public transport.
- The workers shall be warned against hanging onto moving vehicles within the site and heavy penalties should be enforced

7.1.1.5 Interruption of Existing Installed Amenities

There are various installations which cross on the project sites, among them are underground and overhead utilities e.g. electricity, telephone links, fiber cables and water distribution lines.

These services are critical and have implications with spillover effects on the social and economic performance.

Mitigation Measures

- Formal request for permission should be sought and the relevant institutions such as Kenya Power and Lighting Company, data network companies and NCWSC before undertaking construction works;
- Timely reinstatement of damaged utilities
- The Contractor to carry out trial pits to identify the existing amenities. This will minimize the number of damages on site

7.1.1.6 Labor influx

Large construction projects often require labour force and associated goods and services cannot be fully supplied locally for reasons such as worker unavailability and lack of technical skills and capacity. Majority of the labour force needs to be brought in from the respective villages within Syokimau, Mlolongo, Katani and environs.

Mitigation Measures

- Reduce labour influx by giving first priority during labour recruitment to the local community. Specialized workmen may be hired from elsewhere however it is important to train and engage local workers since they may be required for the operation of the project.
- The Contractor to develop a labour management plan
- The Contractor to liaise with the local authorities and leaders in the recruitment of workers on site.
- The works Contractor should be required, under its contract, to prepare and enforce a No Sexual Harassment and Non-Discrimination Policy, in accordance with national laws
- Effective community engagement and strong grievance mechanisms on matters related to labour
- All workers to sign employment contract including the Code of Conduct.
- The Contractor should develop their company's working policy that will be communicated to all workers and ensure compliance on site
- Sensitize workers on community based social behaviour and conduct.
- Efforts to be geared toward instilling attitudes of tolerance, support and understanding of labour immigrants by the local communities
- Identification cards by workers seeking employment should be provided during recruitment
- The Contractor to adhere to the minimum wages requirement stipulated in the national laws at the time of construction (the regulations wage orders are usually changed by the National government)

7.1.1.7 Child Labor and Protection

The Children Act of Kenya prohibits Contractors from “employing children in a manner that is economically exploitative and detrimental to the child’s education, harmful to the child’s health or physical, mental, spiritual, moral, or social development”. 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

Mitigation measures

- Ensure no children are employed on site in accordance with national labour laws.
- Ensure that any child sexual relations offenses among Contractors' workers are promptly reported to the police.
- Ensuring all workers sign and adhere to the code of conduct.
- Ensure that all the workers have national identification cards.

7.1.1.8 Gender Equity, Sexual Harassment

Construction workers who are away from home on the construction job are typically separated from their family and act outside their normal sphere of social control. This can lead to inappropriate and criminal behaviour, such as sexual harassment of women and girls, exploitative sexual relations, and illicit sexual relations with minors from the local community. In large scale cases, male labour may also lead to an increase in exploitative sexual relationships whereby women and girls are forced into them.

Mitigation measures

- The Contractor should be required to prepare and enforce a No Sexual Harassment and Non-Discrimination Policy, in accordance with national laws where applicable.
- Strive for an equitable distribution of employment opportunities between men and women. Mainstream Gender Inclusivity in hiring of workers as required by Gender Policy 2011 and 2/3 gender rule;
- The Contractor should prepare and implement a gender action plan to include:
 - ✓ Gender mainstreaming in employment at the worksite with opportunities provided for females to work, in consonance with local laws and customs
 - ✓ Gender sensitization of workers (this could be done by the HIV/AIDS services provider)
 - ✓ Provision of gender segregated sanitation facilities
 - ✓ Grievance redress mechanisms
 - ✓ Assessment of main risks (gender-based violence, sexual harassment) within and from the construction activities, as well as opportunities to promote gender equality

7.1.1.9 Increased Gender Based Violence

There are various form of Gender Based Violence (GBV) such as physical, emotional, financial and psychological amongst others. Project team members been on a position of advantage, may exploit the local communities and practices either knowingly or unknowingly GBV on site. GBV cases may also be reported amongst the project team especially between supervisors and the workers. It should be noted GBV may be experienced by both males and females.

Mitigation Measures

- Develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project e.g. effective and on-going community engagement and consultation, particularly with women and girls;
- Ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation
- Sensitization of workers and the community on GBV and the various forms.
- Having workers sign and comply with the code of conduct.
- Heavy penalties to be enforced for workers found to have been the perpetrators in any form of GBV.
- For interventions proposed in and near schools the project team should coordinate with the school management to train and sensitize students and pupils about GBV.
- Minimal to no interaction with students and pupils during construction of proposed interventions in schools

7.1.1.10 Sexual Exploitation and Abuse (SEA)

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.

Mitigation Measures

- Develop and implement an SEA action plan with an Accountability and Response Framework as part of the C-ESMMP.

7.2 Operation Phase Positive Impacts

7.2.1 Creation of Employment

During operational phase, there shall be employment opportunities especially for those who shall be employed to manage and maintain the water and sewers lines. This shall improve the living standards of these employees. NCWSC shall also employ more staff to assist in connecting its customers to water systems.

7.2.2 Creation of Wealth

The proposed project shall ultimately provide revenues to the beneficiaries and expand the wealth base for the nation. It shall pump both liquefied and tied up wealth hence making the nation gain.

7.2.3 Improved Well-being of Women and Children

At the household level, women and children bear the burden of fetching water. Other than the time spent in getting water, these practices has far reached consequences on their health and wellbeing. Time saved thus would be invested in other engagements that could bring financial benefits to the family. Children also bear the brunt of water borne diseases while women are tied down to provide nursing care to the sick family members.

7.2.4 Improved Accessibility to Clean and Reliable Water Supply

The proposed project is intended to improve the accessibility, availability and affordability of water within the project areas.

7.2.5 Increased Revenue for Nairobi Water and Sewerage Company

Increased revenue to Nairobi Water and Sewerage Company from increased customer base as the proposed project shall increase the number of residents being served by the water companies thus improving sustainability of the company.

7.2.6 Reduced Exposure to Health Risks and Improved Nutrition

Improved water services shall lead to reduced cases of water borne diseases associated with consuming unsafe water. Accessibility to clean water shall improve the health and well-being for the residents.

7.3 Occupational safety and health impacts

Labour camps including workers' living and eating areas; grounds where equipment will be stored and serviced; and where construction materials will be stockpiled is likely to bring a temporary influx of migrant workers. This may stimulate business in the project area and also propagate the spread of STI's including HIV/AIDS. There could also be cases of unwanted pregnancies as the migrant workers interact and get into relationships with the local communities. Local services such as medical, water supplies sanitation and waste disposal can be over stretched by the sudden increase in population. Improper sanitation arrangements at the camps can cause contamination of groundwater and pose a major health hazard, and outbreaks of diseases such as diarrhea, cholera and typhoid.

Mitigation measures

Minimizing spread of the Corona virus, HIV/AIDS and other STI's due to the presence of migrant workers is meant to reduce the increase of STIs and HIV among the host community and among the project workers. The following measures should be put in place

- Sensitize the migrant workers on risky sexual behavior.
- Have VCT services on site and encourage workers to undergo the same.
- Provision of protective devices such as condoms.

Provision shall be made for employee facilities including shelter, toilets and washing facilities.

- Toilet facilities supplied by the contractor for the workers shall occur at a minimum ratio of Toilet per 30 workers (preferred 1:15).
- The exact location of the toilets shall be approved by the Public Health Department prior to establishment.
- Sanitation facilities shall be located within 100m from any point of work, but not closer than 50 m to any water body.
- All temporary/portable toilets shall be secured to the ground to prevent them toppling due to wind or any other cause.
- The contractor shall ensure that the entrances to toilets are adequately screened from public view.
- These facilities shall be maintained in a hygienic state and serviced regularly.
- Toilet paper shall be provided
- The contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the

contents are removed from site to an approved disposal site.

- Discharge of waste from toilets into the environment and burying of waste is strictly prohibited.
- Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas are not polluted.

7.4 Decommissioning Phase

7.4.1 Positive impact

7.4.1.1 Employment opportunities

Temporary employment opportunities will be created for the demolition of laid and constructed structures during the decommissioning works.

7.4.2 Environmental rehabilitation

Rehabilitation of site to ensure the site is left as natural as possible close or better than before.

7.4.3 Negative Impacts

7.4.3.1 Loss of jobs and income

The people that will be employed to operate and maintain the water supply system will lose their jobs immediately after the closure of the project. The loss of jobs will have far reaching impacts as it will lead to loss of income and social stress.

Mitigation measures

- Notify the employees in advance on the project closure date and adequately compensate them;
- Dismissal procedures to be compliant with Employment Act, 2007;
- Provide counseling and alternative skills for alternative activities;
- Employer should find alternative means of livelihood for the staff who were employed at the treatment plant.

7.4.3.2 Noise Pollution

Activities likely to produce noise during decommissioning include demolition of structures and excavation of pipeline works and structures at the intake areas as well as any staff offices and quarters built on site.

Mitigation measures:

- Schedule noisy activities during the day time period;
- Use silencers on machines where possible;
- Ensure machinery is well maintained to reduce noise emitted.

7.4.3.3 Solid Waste Material

It is expected that large amounts of solid waste material arising during decommissioning will include: glass panels, stones, pipes, wood, metal, paper, plastic, equipment, vegetation, etc. The proper disposal of these materials is critical. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment.

Mitigation measures:

- Disposal of solid waste in compliance with EMCA 2006 Waste Management Regulations;

- Segregation of waste to encourage reuse and recycling;
- Ensuring that the contracted waste collector is registered with NEMA to collect and dispose wastes.

7.4.3.4 Occupational health and safety

If not handled with care the demolition may lead to exposure of hazardous chemicals to workers and surrounding communities which poses as health risks to them. Machinery and equipment used for the same also possess as danger to the workers if not handled well and with the correct PPE.

Mitigation measures:

- Provide the correct PPE for the workers when conducting the demolition activities;
- Conduct training on health and safety procedures to the workers prior to commencement of demolition;
- Proper plans should be made prior to demolition so as to contain the raw sewage and other waste water that poses as health risk to human beings and the environment, to prevent the workers and surrounding communities from getting into contact with it.

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CHAPTER 8: ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP)

8.1 Introduction

The aim of the environmental and social management and monitoring plan (ESMMP) is to detail the actions required to effectively implement the mitigation measures identified and recommended in the ESIA. These actions are required to minimize negative impacts and enhance positive impacts associated with the proposed Mlolongo, Syokimau, Katani water supply project. The ESMP actions present the commitments made by the proponent, for addressing the impacts of the project. It is important to note that an ESMMP is a living document since it is to be updated and amended as new information (e.g. environmental data), policies, authority guidelines and technologies develop. The ESMMP identifies management actions that need to be implemented in various phases of the proposed project life cycle as follows.

8.1.1 Planning and design phase

Refers to the stage when the feasibility studies are being undertaken, the project description is being developed and water supply for Syokimau, Mlolongo, Katani, Embakasi Garrison and JKIA is being designed. During this phase, the ESIA is completed and the license is applied for.

8.1.2 Construction phase

This will commence after the proposed Mlolongo, Syokimau & Katani Water Supply Project license has been issued and AWWDA has taken the decision to implement the project. The construction phase involves the development and construction of the project infrastructure.

8.1.3 Operations

This is the phase during which the proposed project will be in operation and the targeted beneficiaries; Mlolongo, Syokimau & Katani, Embakasi Garrison, JKIA and surrounding environs residents will commence benefiting from the project.

8.1.4 Decommissioning Phase

The decommissioning phase of a project includes restoring the environment to its original form once all the operational activities of the project have ceased. The project has been designed to operate effectively for over 20 years. The necessary activities, mitigation measures, allocation of responsibilities, time frames and costs pertaining to prevention, minimization and monitoring of all potential impacts associated with the decommissioning and closure phase of the project are outlined in the table below.

8.2 Management Responsibility of ESMMP

In order to ensure the sound development and effective implementation of the ESMMP, it will be necessary to identify and define the responsibilities and authority of the various persons and Organizations which will be involved in the project. The following entities should be involved in the implementation of this ESMMP:

a) Mavoko Water and Sanitation Company and Nairobi City Water and Sanitation Company

Mavoko Water and Sanitation Company will be charged with the responsibility of ensuring that the proposed development has been put up in an environmentally sound manner. This can be achieved by inclusion of environmental specifications in the tender specifications, selection of renowned environmentally conscious contractors and supervision to

ensure that the objectives of this ESMMP are met.

b) National Environment Management Authority (NEMA)

The responsibility of NEMA is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of the Government of Kenya in the implementation of all policies relating to the environment.

c) The Contractor

The persons/firms contracted to put up the proposed water supply project will be required to comply with the requirements of the ESMMP within this report. To ensure strict compliance, the environmental specifications of this ESMMP should form part of the contract documents.

d) Consultant

The sourced consultant will have to ensure that the proposed ESMMP is up to date and is being used by the contractor. Periodic audits of the ESMMP will have to be done to ensure that its performance is as expected.

e) County Government of Machakos and County Government of Nairobi

The relevant departmental officers in the above local authorities should be called upon where necessary during project implementation to provide the necessary permits and advisory services to the project implementers.

8.3 Environmental Social Management and Monitoring Plan

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts for the proposed project in Machakos and Nairobi County is provided below for the; a) construction stage, b) operational stage, and dc) decommissioning stage respectively.

Table 8-1: Construction Environmental and Social Management and Monitoring Plan

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
Environmental Impacts					
Noise and vibration	- Prior communication to the school board and management before constructions works should be made especially where construction activities will be taking place along the schools as presented under sensitive receptors - Early notifications should be made to institutions and businesses (listed in Error! Reference source not found.) prior the commencement of works within their area. This is to inform them they may experience some disruptions for few days during construction. Notification is a form of courtesy and will reduce conflicts and disagreements between the community and the project team. - Construction noise should not exceed 60 dB (A) during the day as per the Second Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. - Machinery, vehicles and instruments that	Moderate	All work areas <u>Responsibility</u> Contractor(s)	- Reported complaints from neighbor and community institutions - Noise Measurements records of all the active sites - Availability of the Contractor's Noise/Vibration Management Plan. <u>Monitoring Frequency</u> trice during construction	KES 500,000

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	emit high levels of noise shall be used at intervals and the workers shall work interchangeably to reduce the overall impact and exposure time. These pieces of equipment such as concrete vibrator, compressors, plate compactors and cement mixers etc (listed in Table 7-1) should also be used when the least number of residents can be expected to be affected, for example during periods where most residents are at work, school, weekends or holidays • Establish channels for feedback and addressing of concerns raised by stakeholders promptly. • Conduct quarterly assessments of noise levels to ensure they remain within acceptable limits. These assessments shall be done by an external health and safety expert. • Provision of appropriate personnel protective equipment to the workers such as ear muffs and plugs. • Conducting medical examinations(audiometry) by a Designated Health Practitioner for workers exposed to prolonged high noise levels				

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
Dust Emission	- Regularly dust suppression through watering should be done on exposed surfaces, particularly during dry conditions. - Strict protocols should be enforced for handling construction materials in powder form, such as covering of cement and sand during transportation. - Provision of PPE e.g. dust masks to workers. - Reinstatement of disturbed areas once construction is completed. - Minimizing the number of motorized vehicles in use on site. - Conducting workers medical examinations (Pulmonary Function Test (PFT) or Spirometry) by a Designated Health Practitioner for especially for workers exposed to cement and dust.	Moderate	All work areas <u>Responsibility</u> Contractor(s)	- Records of PPEs issued to workers (Dust Masks) - Records of the amount of water used for dust suppression - Photo Logs - Records of the number of vehicles available - Availability of water bowsers <u>Monitoring Frequency</u> Daily	KES 500,000
Soil Pollution	- A portable impermeable surface such as concrete platform should be used to prevent concrete spillage onto soil during concrete works done within the project site. - In case of spilled cement or concrete should be collected and disposed by the licensed waste handler to a NEMA waste collection	Moderate	All work areas <u>Responsibility</u> Contractor(s) Supervision Engineer	- Restoration of site after construction - Availability of drainage channels <u>Monitoring Frequency</u>	As per the BOQ

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	site. - During cement mixing, water management should be key to reduce runoff and unnecessary water wastages. - Use of water sprays or dust suppression equipment around cement mixing areas will minimize airborne particles that could settle on soil causing pollution			Daily	
Solid waste generation and wastewater management	- All solid waste will be collected at a central location designated by the Contractor preferably at the campsite and on project site, using clearly labelled and color-coded containers. It will be stored temporarily until it is moved to a NEMA-approved disposal site, handled by a licensed waste collector as per the Waste Management Regulations 2006. - Wherever possible, the Contractor should reuse and recycle waste generated on site. - All personnel assigned to collect waste on site shall be provided with appropriate PPEs i.e. heavy-duty gloves, protective footwear, dust masks and aprons. - A comprehensive site waste management	Moderate	All work areas <u>Responsibility</u> Contractor(s) Supervision	- Number of complaints from community not happy with waste management of spoil material - Records for waste collection and disposal bins - NEMA licensed Waste handler <u>Monitoring Frequency</u> Daily	KES 500,000

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	plan shall be prepared by the Contractor prior to commencement of construction works. This should include designation of appropriate waste storage and segregation areas, collection and removal schedule and identification of approved disposal site by NEMA. - The Contractor shall ensure workers are sensitized on proper waste management methods on site during construction. - Construction of standards septic tank and timely exhaustion of waste when it is full to avoid spill offs				
Site Related Oil Spills	- The Contractor should ensure that the employees on site are aware of the procedures for dealing with spills and leaks through induction, toolbox talks and safety trainings (the Contractor's EHSS shall propose a method of clean-up which shall be subject to approval); - All vehicles and equipment should be kept in good working conditions and serviced regularly in service stations and fueling stations selected by the Contractor - The Contractor to ensure spill kits are	Minor	All work areas <u>Responsibility</u> Contractor(s) Supervision Engineer	- Availability of spill kit - Availability of impermeable containers for storage of fuels, oils, lubricants and chemicals are stored <u>Monitoring Frequency –</u> Daily	KES 150,000 for machine inspection by government inspector & As per the BOQ

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	provided at the construction sites for machines like generators promoting efficient response to spills, minimizing environmental impact and ensuring workers' safety. Ensure fuels, oils, and lubricants are clearly labelled and stored in impermeable containers away from surface drains.				
Impacts on vegetation	- Reinstatement of the project sites after completion of works - The Contractor to adhere to the delineated construction work area. - Planting of grass and trees in sites identified within the project area preferably schools, institutions where they can be secure and well maintained.	Minor	All work areas <u>Responsibility</u> Contractor(s) Supervision Engineer	- Number of trees cut - Number of trees planted - Photos of reinstated areas	KES 150,000
	Environmental Audits		All work areas <u>Responsibility</u> Contractor(s) Supervision Engineer	- Audit reports Frequency - Yearly - Towards project completion	KES 1,000,000
Occupational Safety and Health Impacts					
Workers welfare	Conducting worker's pre-employment and periodic medical examinations by a	High	All work areas	availability of sanitation facilities for males and	KES 1,000,000

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	Designated Health Practitioner. This will include general medical examinations, specialized tests depending on the worker's job description such as Pulmonary Function Test (PFT) or Spirometry for workers exposed to cement and dust, audiometry amongst others as prescribed in the OSHA ACT 2007, Medical Examination Rules, 2005 and Legal Notice No. 50 of 2022 - Provision of Labelled toilet facilities at a minimum ratio of Toilet per 30 workers (preferred 1:15) and the exact location of the toilets shall be approved by the Public Health Department prior to establishment. - The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from site to an approved disposal site. - Provision of adequate clean drinking water and drinking vessels should be made available on site. - Provision of adequate resting areas and gender segregated changing station away from machinery for the workers to be accessed during breaks.		<u>Responsibility</u> Contractor(s) Supervision Engineer	females - Availability of drinking water and drinking vessels - Resting areas <u>Monitoring Frequency</u> Daily	

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
Community Welfare	- Clearly post warning signs indicating the presence of construction activities and potential hazards and communicate construction plans and potential noise impacts to the community prior to construction. This helps reduce conflicts with the community and helps residents plan for their day-to-day activities. - Community members should be notified before work commences for them to be aware of the ongoing works and take precautions. - Provision of pedestrian crossing should be done - Open trench should be barricaded appropriately	Moderate	All work areas <u>Responsibility</u> Contractor(s) Supervision Engineer	- availability of appropriate signages and barricaded site - Minutes of community sensitization meetings - Number of notices issues - Availability of access bridges	KES 500,000
Accidents, injuries and loss of life,	- Develop a site Occupational safety action plan detailing safety equipment to be used, emergency procedures, restriction on site, frequency and personnel responsible for safety inspections and controls adhering to guidelines in the OSHA Act 2007 - Developing a health and safety policy to be adhered to by all the project team members	High	All work areas <u>Responsibility</u> Contractor(s) Supervision team	- Available operator/driver licenses - Appropriate signage's erected on site - Availability of appropriate PPES - Availability of first aiders and first aid kits - Records of accidents and	KES 600,000 & As per the BOQ & WIBA insurance

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	- Conducting Job Safety Analysis and risk assessments before commencing works on new sites. - Conducting machinery and vehicles inspection on site by a licensed inspector - All workers should be provided with appropriate PPEs (Overalls, Reflectors, Helmets, dust masks, Steel toe Gum boots and safety shoes, Heavy duty gloves, Goggles for eye protection) to prevent and minimize accidents and injuries. Appropriate PPEs should be provided as established from risk assessment and enforce their usage. - The workers should receive requisite training especially on the operation of the machinery and equipment from licensed NTSA trainers - Trainings for the workers during induction and toolbox talks on Occupational Health and Safety, first aid and fire safety. - Ensuring that the prepared code of conduct for staff is signed and adhered to - The Contractor shall provide safe means of transportation for workers transported to site daily.			- injuries - Training records <u>Monitoring Frequency</u> Daily	

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	- Trenches should be well secured using warning tape, hard barricades and with appropriate, visible signages. - Access ladders shall be provided to facilitate movement in and out of the trenches and during masonry works. - Sensitization shall be done to all workers on safe transportation of materials and penalties for not adhering shall be communicated through inductions and toolbox talks. - Provide fully equipped First Aid Kits within the construction sites and ensure that at any moment during the works, there is a trained first aider on site. The ration of trained first aiders to worker will be as per defined by the OSHA First Aid Rules. - Recording of all accidents, injuries and deaths that occur on site in the incident register, corrective actions for their prevention and investigated as appropriate. - Contractor should have an up-to-date Work Injury Benefit Act (WIBA) and the Contractors All risk plan and maintain insurance cover that covers all workers throughout the construction period.				

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	- The Contractor to have an agreement with local health facilities for the provision of emergency services - Community members should be notified before work commences for them to be aware of the ongoing works and trained on the safety measures to be followed. - Proper maintenance of tools and machineries highlighted in Table 7-1				
Fire outbreak	- Label all inflammable materials and store them appropriately - Provision of adequate fire-fighting equipment capable of fighting all classes of fire - Put — 'No Smoking' Signs in areas where inflammable are stored and designating smoking zones within the project areas with ash trays. - Train workers on the use of fire-fighting equipment - Develop an emergency response plan. - Establish fire assembly points in every site. - Avail inspected and appropriate fire	Minor	All work areas <u>Responsibility</u> Contractor(s) Supervision team	- Incidence of reported cases of fuel leaks and fire incidences - No of available fire extinguishers and type - Training records on fire safety - Available designated smoking zones <u>Monitoring Frequency</u> Daily	KES 100,000

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	extinguishers near generator and other flammable materials. Employ trained fire marshal in all active sites.				
	Trainings and audits for the workers on Occupational Health and Safety, first aid and fire safety		All work areas <u>Responsibility</u> Contractor(s) Supervision team	- Training records and attendance - Training reports - Audit reports <u>Monitoring Frequency</u> - Frequently	KES. 800,000
Social Impacts					
Removal of Structures and Loss of livelihood	- Implement RAP & LRP before commencement of civil works at the affected sites. The RAP exercise was done and a report was prepared and shared separately. - Obtaining letters of no objections from relevant stakeholders before implementation of construction works - Limit damage to property by observing construction area limits - The Contractor and Consultant shall communicate with the owners of the potential structures to be removed that are	Moderate	All work areas <u>Responsibility</u> Client (AWWDA) assisted by the Consultant Supervision team	- No of compensated PAPs - No of grievances recorded and resolved <u>Monitoring Frequency</u> Weekly and on need basis	As per the RAP

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	within the project sites.				
Liability for damage to private property	- The Contractor to promptly repair and reinstate any damages done to private property. - Limit damage to property by observing construction area limits by clear demarcation. - The workers should receive requisite training especially on the operation of the machinery and equipment.	Moderate	All work areas <u>Responsibility</u> Contractor(s) Supervision team	Number of reinstatements conducted <u>Monitoring Frequency</u> Daily and on need basis	As per the BOQ
Crime incidences and Vandalism	- Working with local committees e.g., <i>Nyumba Kumi</i> to provide security within the site in addition to the Contractor's own security. - The Contractor should ensure the proper barricading of the campsite and deploy trained security personnel. - All workers should sign the code of conduct on site and ensure adherence. - The Contractor should prepare and implement a security management plan. - Expelling any employee who persists in any misconduct or lack of care, carries out duties incompetently or negligently, fails to	Moderate	All work areas <u>Responsibility</u> Contractor(s) Supervision team	- Fencing of the campsite and barricading active sites - No of crime cases reported - Security management plan <u>Monitoring Frequency</u> Daily	KES 200,000 security measures & As per Contractor's rates

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	conform to any provisions of the contract, or persists in any conduct which is prejudicial to safety, health, or the protection of the environment. Taking all reasonable precautions to prevent unlawful, riotous or disorderly conduct by or amongst the Contractor's personnel, and to preserve peace and protection of persons and property on and near the site.				
Spread of HIV/AIDS, and STI's	- Develop HIV/AIDS awareness programs or initiatives to target the construction workers, community, institutions and the general members of the community, particularly the youth; with the objective of reducing the risks of exposure and the spread of HIV/AIDS. - Provide VCT services on site and encourage workers to undergo the same. - Provision of protective devices such as condoms. - Maximize hiring skilled and unskilled workers from the local community	Minor	All work areas <u>Responsibility</u> Contractor(s) Supervision team	- HIV/AIDs Programme - Condom dispenser - No of sensitization meeting held, attendance sheet <u>Monitoring Frequency</u> Weekly	KES 500,000
Impact on traffic and	Provide accessible diversion routes where possible and communicate to the community	Moderate	All work areas	Availability of adequate signages	KES 500,000

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
difficulty of access	in advance. - Hoarding using safety tapes and hard barricades along the open trenches to avoid accidents. - Adequate and appropriate warning signs should be placed at potential risk locations and should be visible at night. The signs should be in a language understandable by all. - The Contractor to expedite construction works to reduce the times where entrances are blocked especially in businesses and home entrances. - Access by residents should be facilitated by installing appropriate firm temporary bridges across open trenches that should have support handrails. - The workers should receive requisite training especially on the operation of the machinery and equipment and those undertaking material delivery from licensed NTSA trainers. - Training workers on traffic management on site and availing trained traffic marshals along roads such as Mwananchi, Kiungani,		<u>Responsibility</u> Contractor(s) Supervision team	- Availability of a traffic management plan on site - Availability of temporary bridges with handrails - Trained traffic marshals - Provision and use of safety barrier/bollards <u>Monitoring Frequency</u> Daily	

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	community, parliament Chady, Quarry road and other un-named roads within the settlement • Provision of appropriate PPEs and safety measures whenever there are works that may require microtunnelling or deep excavations of the tarmac roads. • Sensitization shall be done to all workers on safe transportation and penalties for not adhering shall be communicated through inductions and toolbox talks. • All motor vehicles should be road worthy and properly serviced. • Drivers should sign codes of conduct. • The Contractor shall provide safe transportation of the skilled workers to site where need be since workers will be sourced locally. This will be by either contracting a licensed public service transport provider or using own vehicle that meets requirements for public transport. • The workers shall be warned against hanging onto moving vehicles within the site and heavy penalties should be enforced				

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
Interruption of existing amenities	- Formal request for permission should be sought and the relevant institutions such as Kenya Power and Lighting Company, data network companies and NCWSC before undertaking construction works; - Timely reinstatement of damaged utilities - The Contractor to carry out trial pits to identify the existing amenities. This will minimize the number of damages on site	Moderate	All work areas <u>Responsibility</u> Contractor(s) Supervision team	Number and records of reinstatements done <u>Monitoring Frequency</u> Daily and on need basis	As per the BOQ
Labour Influx	- Reduce labour influx by giving first priority during labour recruitment to the local community. Specialized workmen may be hired from elsewhere however it is important to train and engage local workers since they may be required for the operation of the project. - The Contractor to develop a labour management plan - The Contractor to liaise with the local authorities and leaders in the recruitment of workers on site. - The works Contractor should be required, under its contract, to prepare and enforce a No Sexual Harassment and Non-	Moderate	<u>Responsibility</u> Contractor(s) Supervision team	- Availability of labour management plan - Availability of Contracts - Labour records <u>Monitoring Frequency</u> weekly	KES 500,000 for community engagement & As per the Contractors estimates

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	Discrimination Policy, in accordance with national laws • Effective community engagement and strong grievance mechanisms on matters related to labour • All workers to sign employment contract including the Code of Conduct. • The Contractor should develop their company's working policy that will be communicated to all workers and ensure compliance on site • Sensitize workers on community based social behaviour and conduct. • Efforts to be geared toward instilling attitudes of tolerance, support and understanding of labour immigrants by the local communities • Identification cards by workers seeking employment should be provided during recruitment • The Contractor to adhere to the minimum wages requirement stipulated in the national laws at the time of construction (the regulations wage orders are usually changed				

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	by the National government)				
Child labour	- Ensure no children are employed on site in accordance with national labour laws. - Ensure that any child sexual relations offenses among Contractors' workers are promptly reported to the police. - Ensuring all workers sign and adhere to the code of conduct. - Ensure that all the workers have national identification cards.	Minor	<u>Responsibility</u> Contractor(s) Supervision team	- Availability of identification cards for all workers on site - Complaints received by residents in regard to child labour <u>Monitoring Frequency</u> Monthly	No additional cost
Gender Equity & Sexual Harassment	- The Contractor should be required to prepare and enforce a No Sexual Harassment and Non-Discrimination Policy, in accordance with national laws where applicable. - Strive for an equitable distribution of employment opportunities between men and women. Mainstream Gender Inclusivity in hiring of workers as required by Gender Policy 2011 and 2/3 gender rule; - The Contractor should prepare and implement a gender action plan to include: ✓ Gender mainstreaming in employment at	Moderate	<u>Responsibility</u> Contractor(s) Supervision team	- No of complaints received - Availability of gender action plan <u>Monitoring Frequency</u> Daily	No additional cost

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	the worksite with opportunities provided for females to work, in consonance with local laws and customs ✓ Gender sensitization of workers (this could be done by the HIV/AIDS services provider) ✓ Provision of gender segregated sanitation facilities ✓ Grievance redress mechanisms ✓ Assessment of main risks (gender-based violence, sexual harassment) within and from the construction activities, as well as opportunities to promote gender equality				
Increased GBV	• Develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project e.g. effective and on-going community engagement and consultation, particularly with women and girls; • Ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation • Sensitization of workers and the community	Moderate	<u>Responsibility</u> Contractor(s) Supervision team	• Availability of trained materials, photographs and attendance sheet • Signed CoC <u>Monitoring Frequency</u> Daily	KES 500,000

Associated Impacts	Management Actions	Significance	Target Areas & Responsibilities	Monitoring Indicator & Monitoring Frequency	Budget (KES)
	on GBV and the various forms. - Having workers sign and comply with the code of conduct. - Heavy penalties to be enforced for workers found to have been the perpetrators in any form of GBV. - For interventions proposed in and near schools table 3-2), the project team should coordinate with the school management to train and sensitize students and pupils about GBV. - Minimal to no interaction with students and pupils during construction of proposed interventions in schools				
Sexual Exploitation and Abuse (SEA)	Develop and implement an SEA action plan with an Accountability and Response Framework as part of the C-ESMMP.	Moderate	<u>Responsibility</u> Contractor(s) Supervision team	- Availability of a SEA action plan - No of complaints received in regard to SEA <u>Monitoring Frequency</u> Daily	Cost catered under GBV

Table 8-2: Operational Environment and Social Management Plan

Potential Impacts	Management Actions	Target Areas& Responsibilities	Monitoring Indicators	Time frame	Budget
Risk of illegal connection and vandalism of the water pipeline	- This will require constant inspection by MAVWASCO officials and installation of leak and burst detectors at designated areas along the pipeline. - Conduct public sensitization programs on importance not interfering with the water pipeline and the need to seek official water connection from MAVWASCO	All work areas <u>Responsibility</u> MAVWASCO	Number of inspections conducted within a week No of repairs done Minutes of public sensitization programs held	Throughout Operation period	To be established at operation phase and included in the operation of the projects
Increased domestic wastewater generation	Train the community on the need of good waste management practices	All work areas <u>Responsibility</u> MAVWASCO	Minutes /training materials on waste water management Improved technologies recorded within the communities on waste water management		
Risk of water pipeline bursts leading to water wastage	- Regular check, repair and maintenance of the water pipeline - Activate a community watch group for information sharing on the status of the water line	Water pipeline routes <u>Responsibility</u> MAVWASCO	No of inspection conducted to detect burst availability of	Throughout Operation period	

Potential Impacts	Management Actions	Target Areas& Responsibilities	Monitoring Indicators	Time frame	Budget
	- Implement a leak detection and repair program (including records of past leaks and unaccounted- for water to identify potential problem areas) - The risk of pipeline bursts is low as the pipeline design, including the selection of pipe material and pipe pressure classes, has been carried out so as to minimize this risk. - This risk will be further minimized through regular inspection, repair and maintenance of the pipeline by the Operator, MAVWASCO	NCWSC	a community watch group availability of leak and repair program		
Risk of encroachment and construction of structures on the pipeline way leave	- Arrest and prosecution of encroachers as required by Machakos County Bylaws on Way Leaves and Road Reserves - MAVWASCO to undertake awareness campaigns aimed at preventing encroachment	All work areas <u>Responsibility</u> MAVWASCO	Minutes/ records of awareness campaigns aimed at preventing encroachment conducted	Throughout Operation period	

Table 8-3: Decommissioning ESMMP

Potential Impacts	Management Actions	Responsibilities	Monitoring Indicators	Time frame	Budget
Solid Waste Generation	All removed materials that will not be used for other purposes must be removed and recycled/reused as far as possible;	Contractor	Record of waste collected,	One-off	To be established a decommissioning phase and
	Where recycling/reuse of the removed materials and other demolition waste is not possible; the materials should be taken to a licensed waste disposal site or arrangements made with the County Government;	Contractor	Reused or, recycled and how water has been reduced	One-off	
	Donate reusable demolition waste to charitable organizations, individuals and institutions;	Contractor		One-off	
Degradation of vegetation at the construction site	Implement an appropriate re-vegetation programme to restore the site to better status;	Contractor	State of restored site	One-off	
	Consider use of indigenous plant species in re-vegetation;	Contractor	No of indigenous trees planted	One-off	
	- Trees should be planted at suitable locations so as interrupt slight; - Lines (screen planting), between the adjacent residential area and the development;	Contractor		One-off	

CHAPTER 9: : RECOMMENDATIONS AND CONCLUSION

9.1 Recommendation

The ESIA team recommends the following:

- All the recommendations/ mitigations mentioned in the assessment should be financed, and incorporated in the construction and supervision contracts, technical specifications and the Bill of Quantities.
- The Bid documents prepared for the project to incorporate the Environment, Social Health, and Safety Provisions discussed under Chapter 7 (Environment and Social Impact Assessment and Mitigation Measures).
- The Project should ensure continuous stakeholder engagement throughout all project phases.
- The Contractor will be required to prepare a Construction Environment & Social Management Plan (CESMP) which shall be approved by the proponent before the beginning of works. Within the C-ESMP suite, the following instruments should be prepared:
 - ❖ Health and Safety Management Plan.
 - ❖ Traffic Management Plan.
 - ❖ Labour, Influx and Local Recruitment Management Plan.
 - ❖ Stakeholder management Plan.
 - ❖ Emergency Response Plan.
 - ❖ A Gender Responsive Grievance Redress Management Plan for Internal and external grievances.
 - ❖ HIV/AIDS Policy and Gender Based Violence Management Plan
 - ❖ Child Protection Strategy.
 - ❖ Waste Management Plan.
- The proponent should set up a proper and applicable Grievance Redress Mechanism (GRM) for the project to deal with grievances and issues on the project.
- Diligence on the part of the Contractor and proper supervision by the project Engineer during construction and the initial operation phase is crucial for mitigating impacts.
- Periodic environmental and social monitoring is required by the project Proponent to ensure that mitigation measures have been implemented to prevent or avert any negative impacts of the project.
- At project implementation stage, the Contractor to report monthly ESHS compliance to the project management team comprising of the Project Proponent and Supervision Consultant.
- On completion, AWWDA to commission an independent Consultant to undertake an initial Environment, Social, Health and Safety Audit as required by and Environmental (Impact Assessment and Audit) (amendment) Regulations, 2019. The audit will identify nonconformities which the Contractor together with AWWDA will address through the defect liability period of the project. This audit will also form the basis of annual project self-audits by AWWDA.
- The proponent to implement RAP/LRP before project implementation.

9.2 Conclusion

The proposed project is environmentally, legally, and socially acceptable. The proposed project as noted from the assessment is likely to generate both positive and negative impacts within the project area. It is worth noting the potential significant environmental impacts can be adequately mitigated by the proposed measures, and it is the responsibility of the Proponent and all other Project Implementation Unit to ensure the measures are implemented and strict compliance during project implementation. An ESMMP has been prepared, and it includes: the impacts, the mitigation plan; the monitoring and enforcement requirements; and the responsible persons/organizations. The ESMMP been a dynamic document will form as a guide in the enforcement of the proposed mitigation measures and developing mitigation measures for emerging issues in the project areas.

It is based on the above, that it is recommended that the project be issued with the necessary clearance and licensing for the project to commence implementation

ANNEXES

Annex 1: Firm of Experts EIA License



NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY
ENVIRONMENT MANAGEMENT AND COORDINATION ACT, Cap 387

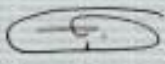
Experts License - Associate/Lead Experts

License No.: NEMA/ENVIS/EL/1063
Application Reference No: NEMA/ENVIS/ELA/05836

M/S Stephen Chege Walruri
of P.O.BOX 6710, 01005, Thika

is licensed to practice in the capacity of a **Lead Expert**
registration number 7872
in accordance with the provision of the Environmental Management and Coordination Act cap 387.

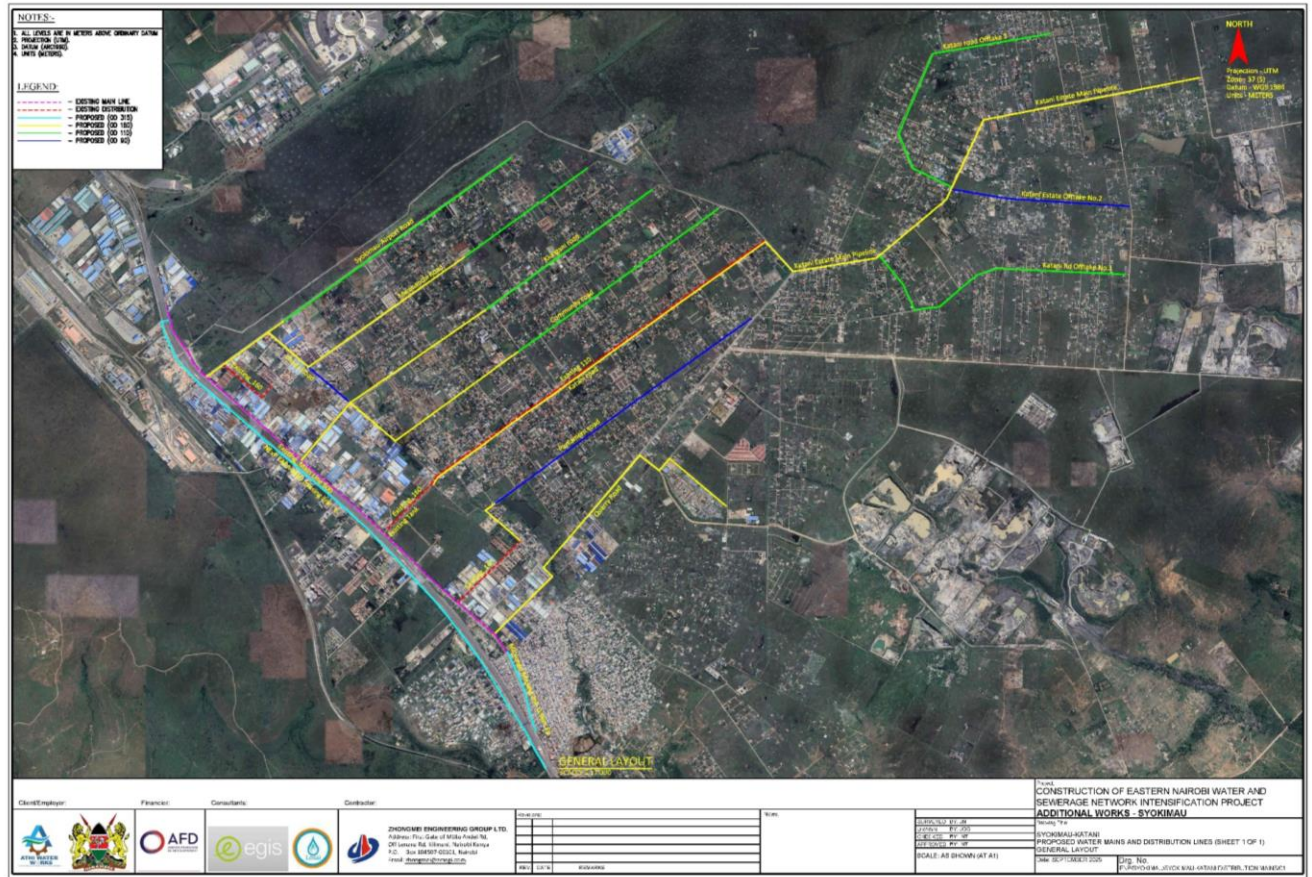
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Expiry Date: 31st December 2026

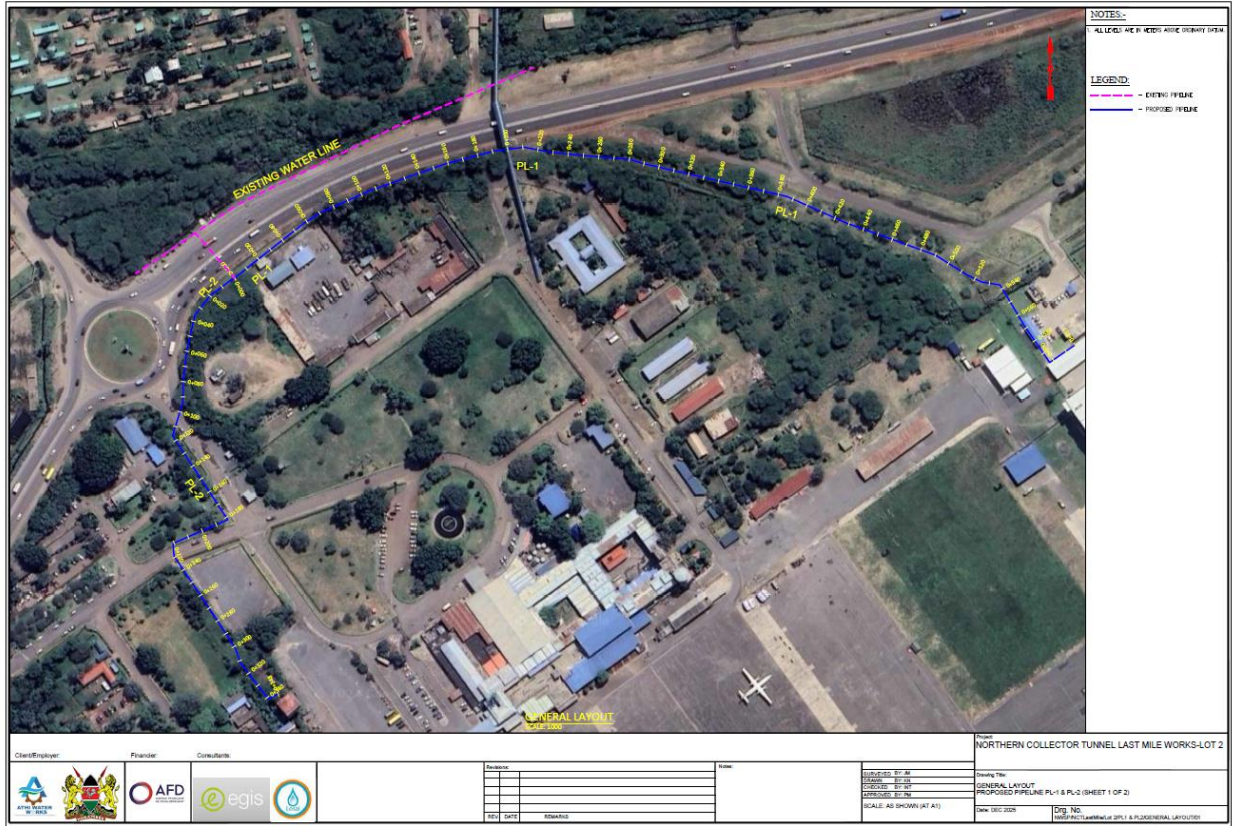

David Ongaro
For DIRECTOR GENERAL
National Environment Management Authority

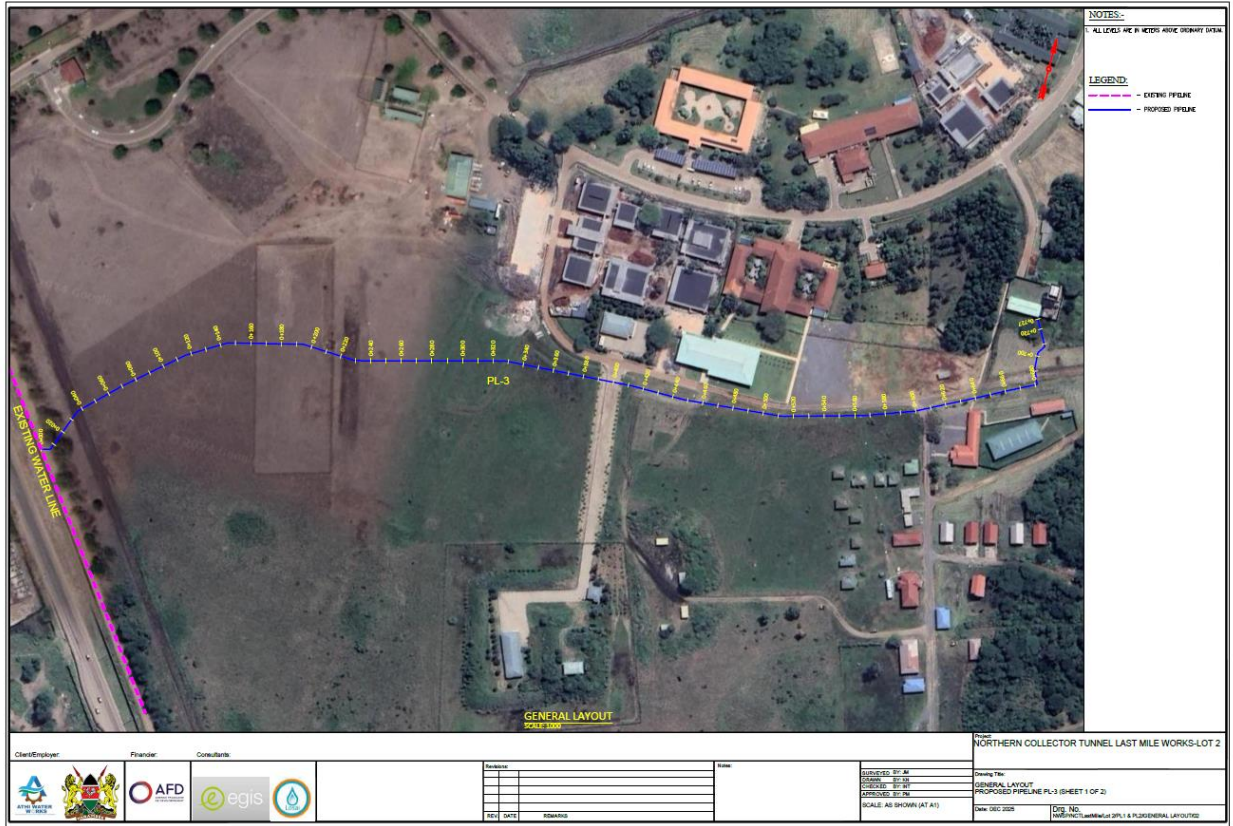
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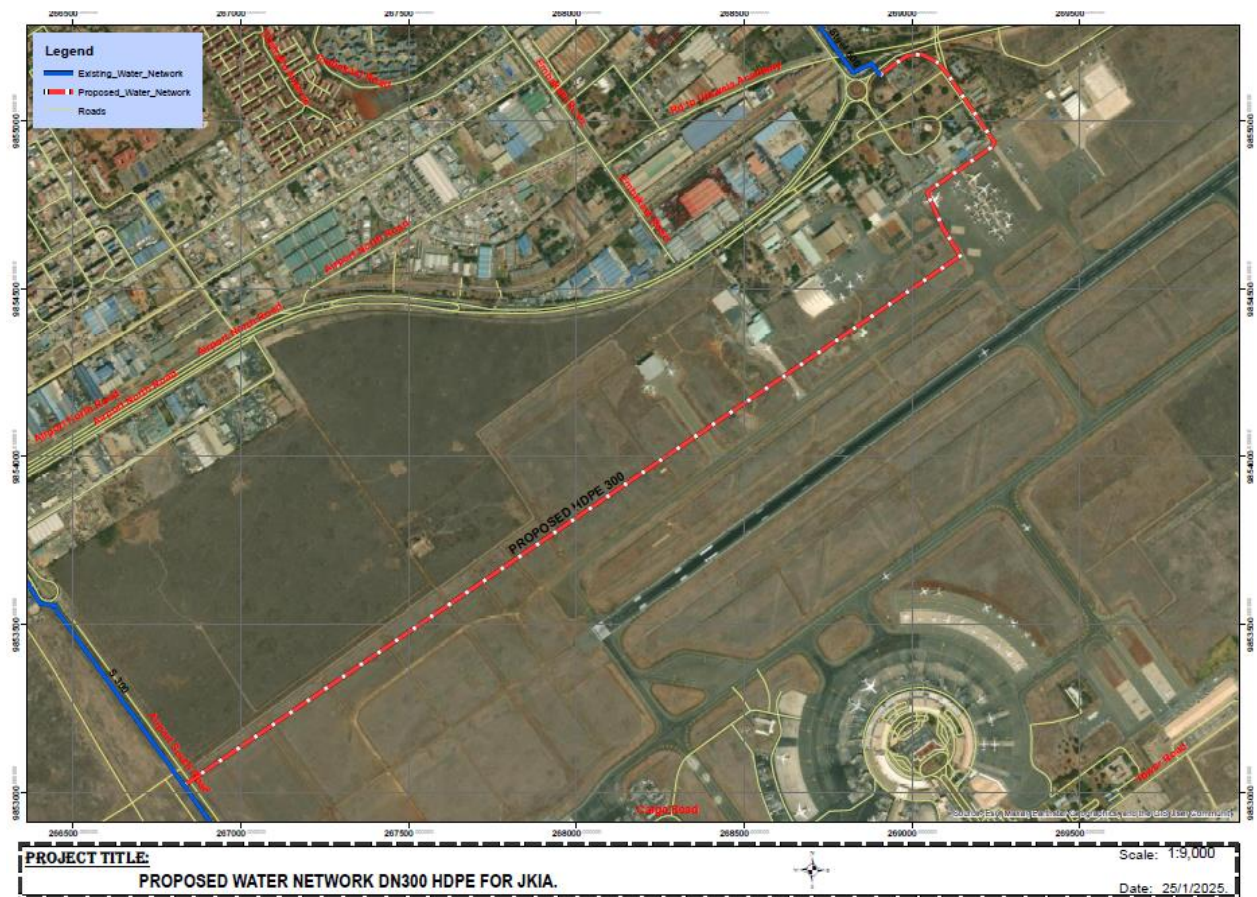
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Annex 2: Layout plan









GRIEVANCE RESOLUTION MECHANISM

1. Steps in dealing with grievances

- Complaint received in writing from affected person
- Recording of grievance in standard form
- Reconnaissance site visit with the complainant.
- Submission of detailed complaint to Resident Engineer for resolution by negotiation.
- Submission of detailed complaint to the Grievance Committee for resolution by mediation.
- Submission of complaint to AWWDA for resolution.

2. Composition of grievance committee

No	Designation	Organization	Position
1.	EHS officer	AWWDA	Chair
2.	Resident Engineer	Consultant	Committee Secretary
3.	EHS officer	Consultant	Committee Assistant Secretary
4.	Site Administrator	Contractor	Member
5.	EHS officer	Contractor	Member
6.	Chief	Community Representative	Member

3. Communication

There is need for clear communication channels to facilitate effective complaint expression. Stakeholders need to feel secure in doing so. Employees who voluntarily limit access to these means of communication will be sanctioned. Communication methods may include but not limited to:

- Worker representative,
- Harassment procedure,
- Community representatives,
- Poster, Boards, brochures.
- Verbal Worker committees,
- Meetings and assemblies,
- Suggestion box,
- Logbooks

4. Communication Means

The communication means that can be used in raising grievances is through

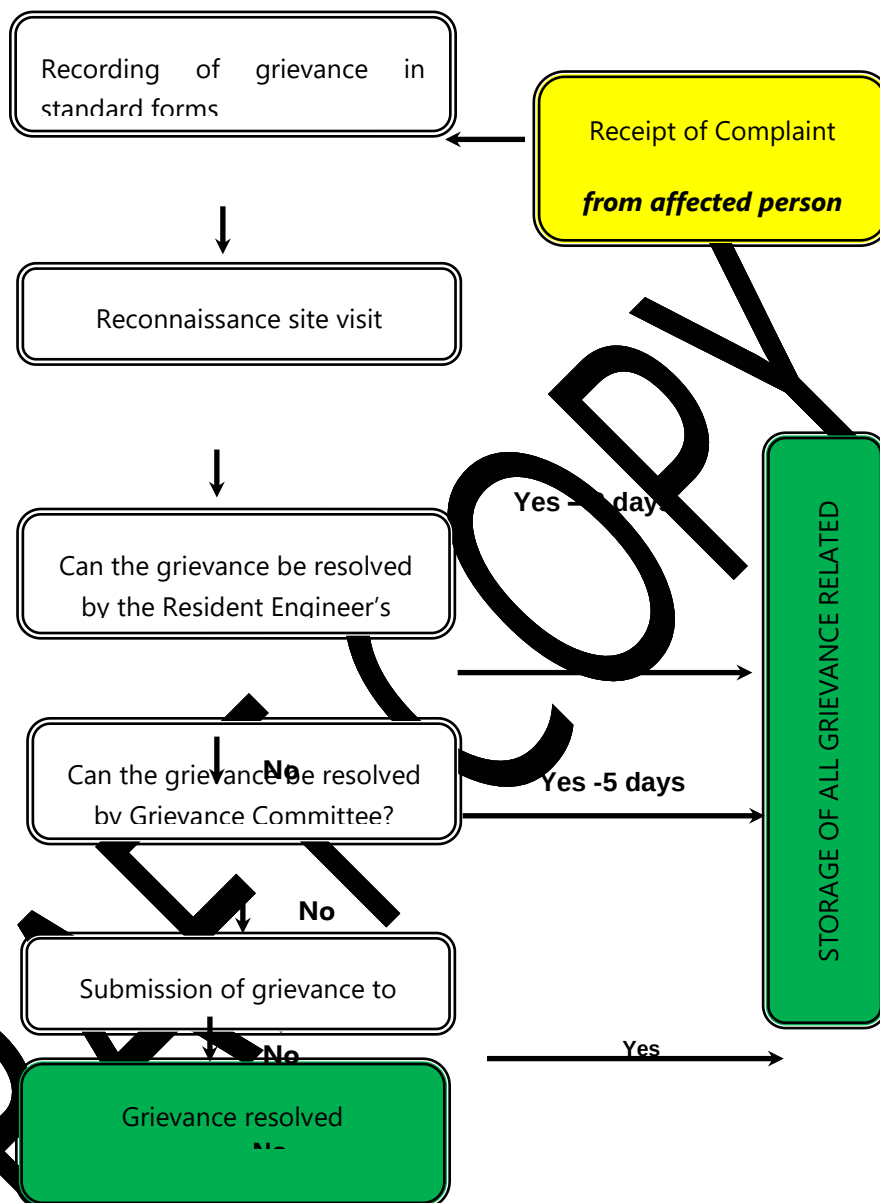
- Email,
- Phone call,

- Complaint form,
- Web-site,
- Complaint to Grievance Committee
- Letter,
- Meetings minutes

The grievance redress mechanisms methods and means of communications should leave room for anonymity. This will ensure the identity of whistle-blowers is protected.

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GRIEVANCE RESOLUTION PROCEDURE



Annex 5: Sample filled questionnaires

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