Government of Kenya

THE NATIONAL URBAN WATER SUPPLY AND SANITATION PROGRAM

ENVIRONMETAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED LAST MILE CONNECTIVITY OF CHUKA SEWERAGE PROJECT IN CHUKA THARAKA NITHI COUNTY

24 APRIL 2024

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DECLARATION

For and on behalf of:

Tana Water Works Development Agency

This Environmental and Social Impact Assessment Report was prepared in accordance with the Environmental Management and Coordination Act (EMCA) 1999 and the Environmental Impact Assessment and Audit Regulations 2003 (revised 2015 & 2019) in order to meet the statutory requirements for the implementation of projects under schedule ii. We, the undersigned, confirm that the contents of this report are a true representation of the ESIA process for the Proposed Last Mile Connectivity of the Chuka Sewerage Project

KEY EXPERTS AND THEMATIC LEADERS ARE AS LISTED BELOW:

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LIST OF ABBREVIATIONS

ACC	Assistant County Commissioner
ADWF	Average dry weather flow
AfDB	African Development Bank
BOD	Biochemical Oxygen Demand
BoQ	Bill of Quantities
BS	British Standard
CBD	Central Business District
COC	Cost of Capital
DCC	Deputy County Commissioner
DN	Nominal Diameter
DOSH	Directorate of Occupational Safety and Health
DWC	Doubled Wall Corrugated
EA	Environmental Audit
EIA	Environmental Impact Assessment
EMCA	Environmental Management Coordination Act
EMMP	Environmental Management and Monitoring Plan
EMP	Environmental Management Plan
EMS	Environmental Management System
ESAF	Environmental & Social Assessment Framework
ESIA	Environmental & Social Impact Assessment
E&S OSs	Environmental and Social Operating Standards
ESMMP	Environmental and Social Management and Monitoring Plan
ESMP	Environmental and Social Management Plan
GBV	Gender Based Violence
GC	General Conditions
GDP	Gross Domestic Product
GI	Galvanized Iron
GIS	Geospatial Information System
GoK	Government of Kenya
GPS	Global Positioning Systems
GRM	Grievance Readdress Mechanism
GRP	Glass Reinforced Plastic
Ha	Hectares
HDPE	High-Density Polyethylene
HH	Household
IBA	Important Bird Area
Km^2	Square kilometre
KNBS	Kenya National Bureau of Statistics
KTSWSSP	Kenya Towns Sustainable Water Supply and Sanitation Program
KW	Kilowatt
L	Litre
L/ca/day	Litre per Capita per Day
LMC	Last Mile Connectivity
M asl	Meters Above Sea Level
M	Meter
M^3/DAY	Cubic Meters Per Day (Flow Rate)

MDAs	Ministries, Departments and Agencies
MEAs	Multilateral Environmental Agreements
Mm	Millimetre
MTPs	Medium Term Plans
MWDM	Ministry of Water Design Manual
MoWSI	Ministry of Water, Sanitation and Irrigation
NCC	Nairobi City Council
NEAP	National Environmental Action Plan
NEMA	National Environment Management Authority
NGO	Non-Governmental Organisation
NIWASCO	Nithi Water and Sanitation Company
NPS	Nominal Pipe Size
O&M	Operation and Maintenance
ºC	Degree Celsius
OD	Outside Diameter
PAP	Project Affected Persons(s)
PCU	Project Coordination Unit
PDWF	Peak dry weather flow
PVC	Polymerizing Vinyl Chloride / Polyvinyl Chloride
PVC-O	Oriented PVC
PWWF	Peak wet weather flow
RAP	Resettlement Action Plan
RE	Residential Engineer
RHP	Rural High Potential.
SEA	Sexual Exploitation and Abuse
STDs	Sexually Transmitted Diseases
ToR	Terms of Reference
TWWDA	Tana Water Works Development Agency
UHC	Urban High Class
ULC	Urban Low Class
UMC	Urban Medium Class
UPVC	Unplasticized Polyvinyl Chloride
WASREB	Water Services Regulatory Board
WRA	Water Resources Authority
WSP	Water Service Provider
WSTF	Water Sector Trust Fund

EXECUTIVE SUMMARY

Overview and Project Description

The Republic of Kenya has integrated its National Water Policy to ensure that by 2030, every citizen has access to clean water and adequate sanitation facilities, aiming to enhance public health, quality of life, and alleviate poverty. Currently, Chuka town lacks sewage treatment infrastructure, prompting the initiation of a project to enhance water supply and sanitation services in Chuka Town, Tharaka Nithi County. The project area spans 280 km^2 in Maara sub-County, bordering Mt. Kenya Forest to the West, Tharaka sub-County to the East. At present, Chuka Town sewerage system is under construction and near completion. The project intends to rectify this by constructing sewer reticulation systems to serve Chuka town, selected residential, institutional, and commercial areas

The use of on-plot sanitation systems such as pit latrines and septic tanks for disposal of effluent is predominant. A Decentralized Sewage Facility has been constructed in Chuka, capacity 22m^3/day i.e., Septic tanks, Anaerobic Baffled Reactor and Constructed Wetland. The facility was commissioned in January 2017 and is currently underutilized due to lack of a sewage exhauster by NIWASCO, public awareness and public health enforcement.

In situations of suppressed water supply, such as in Chuka Town, the use of on-plot sanitation systems though unsustainable environmentally is manageable. Improvements to the sanitation system were designed and planned for Chuka Town to be implemented between year 2018 to 2020 with the development of additional water resources and expansion of the sewer networks. The use of on-plot sanitation systems will not suffice and thus health and environmental hazards are bound to occur. There is, therefore, need for a development of a water-borne sanitation system which is environmentally sustainable.

The scope of the proposed sewer conveyance system includes tertiary Sewers, diameter 225mm of approximate length 9.5Km. The implementation of the last mile connectivity is expected to result in:

- An increased in sewage coverage of Chuka town from 80% to 95%.
- Improved sub-economic life of the people in the target area including environmental conservation.
- Minimized loss of waste water as the treated waste water is released back to the nearby rivers for reuse downstream.
- Improved financial stability as the company will generate more income and employment opportunities.

The project is set to cost approximately on implementation **Ksh. 231,154,035.20**

The following major activities will be undertaken through the project:

- Sensitizing and mobilizing the community and local leaders about the project
- Development of pipe network

- Promotion of plot connections
- Mobilizing and sensitizing the community on home environmental sanitation
- Monitoring and Evaluation of the project

The evaluation of alternatives for the Chuka Sewer LMC project revealed two viable options, each with its advantages and drawbacks. The first alternative, maintaining the status quo or "No Action" approach, would perpetuate existing sanitation provision issues in Chuka, hindering potential health, hygiene, and socio-economic benefits. This option is deemed unfavourable as it would impede long-term development plans and fail to meet the Sustainable Development Goals.

The second alternative involved considering alternative materials for the sewer pipeline, such as PVC double-walled pipes and concrete pipes. While PVC pipes offer cost-effectiveness and chemical resistance, they may lack impact resistance compared to HDPE pipes. Concrete pipes, although durable, were deemed uneconomical for the project due to higher costs and unnecessary structural strength for Chuka's conditions. The ESIA site visits confirmed the viability of DWC HDPE pipes, as they demonstrated resilience to prevailing environmental conditions, making them the preferred choice.

After and in-depth analysis on various piping materials, DWC HDPE pipes are recommended for the Chuka Sewer LMC project. These pipes offer durability, corrosion resistance, and ease of handling, making them well-suited for buried applications in Chuka's soil conditions. Their lightweight nature facilitates transportation and installation, while local availability supports procurement processes and local economic growth. Therefore, DWC HDPE pipes align with the project's objectives of efficiency, resilience, and environmental sustainability

In addition to the LMC proposal, alternative infrastructure options such as decentralized treatment systems, onsite sewage treatment, greywater recycling, natural wastewater treatment, vacuum sewer systems, and septic systems offer valuable alternatives. While these alternatives provide flexibility and environmental benefits, they may face challenges such as higher maintenance costs, land requirements, or limited scalability, making them less suitable for the specific needs and context of the Chuka sewerage project compared to the proposed LMC approach. It was concluded that the proposed last mile connectivity for the Chuka sewerage project presents an efficient solution to the challenge of waste water management in the town, particularly in peri-urban areas by connecting targeted estates to a centralized sewer system.

Brief description of the project site and Environmental Conditions

The Chuka Project Area, situated approximately 180km north of Nairobi within Tharaka Nithi County, encompasses 380 km^2, including Meru South sub-County and bordered by Mt. Kenya Forest, Tharaka sub-County, Maara sub-County, and Embu County. Chuka Town, the largest in the county, resides amidst predominantly rural environs. The region's topography, shaped by Mt. Kenya's volcanic activity, manifests 'V' shaped valleys,

while various rivers like Thuci, Mara, and Mutonga originate from the mountain, eventually draining into the Indian Ocean via the Tana River.

Distinct ecological zones are evident, with highlands adjacent to Mt. Kenya receiving ample rainfall, conducive for agriculture, while the semi-arid low-altitude zone, towards Tharaka sub-County, experiences less precipitation. Unfavourable farming practices, including overgrazing and charcoal burning, have led to soil degradation and erosion, particularly in sloping areas.

The climate exhibits a bi-modal rainfall pattern, with long rains from April to June and short rains from October to December. Rainfall varies from 2,200mm near Mt. Kenya Forest to 500mm in semi-arid regions. Favourable climatic conditions support cultivation of various crops including tea, coffee, and maize. Temperatures range from 14^0C to 30^0 C in highland areas and 22^0 C to 36^0 C in lowland regions.

Soil types include fertile volcanic soils and red soils, supporting diverse agricultural activities. Vegetation ranges from montane forests on higher elevations to savannah grasslands and agricultural lands at lower altitudes. The region boasts rich biodiversity, with diverse plant and animal species, though human activities like deforestation pose threats.

Chuka Town's social-economic profile reveals a diverse population, predominantly engaged in agriculture. The town serves as a commercial hub with markets and small businesses supporting local trade. Water supply within the town is managed by Nithi Water and Sanitation Company (NIWASCO), and community water supply schemes alongside the network, albeit facing challenges such as high non-revenue water (NRW) levels.

Summary of the legislative and policies reviewed

The ESIA protocol was in accordance with the Environmental Management and Coordination Act (EMCA, 1999) and the 2011 NEMA Guidelines for Strategic Environmental Assessment in Kenya for which a wide range of documents were scrutinized through intensive desk studies including the following among others namely the Environmental (Environmental Impact Assessment, and Audit) regulations, 2003, the Waste Management Standards (Legal Notice 121: The Environmental Management Coordination (Waste Management) Regulations), the Water Management Standards (Legal Notice 120: The Environmental Management Coordination (Water Quality) Regulations) and the Environmental Management and Coordination (Noise and Excessive vibration pollution) (Control) Regulations, 2009 (Legal Notice 61), The New Constitution of Kenya, Land policy (2009),Forest policy (2005),Water Policy (1999), Water Act 2002,Wildlife Conservation Act (2013),Kenya Vision 2030, NEAP (2009-2014), Kenya National Policy on water and Sanitation 2016, National Water Services Strategy, National Water Master Plan.

The proponent will play a crucial role in ensuring compliance with reviewed regulations and guidelines, as outlined in the Environmental Management and Coordination Act (EMCA, 1999) and other relevant legal frameworks including:

1. **Understanding and Incorporating Regulations**: TWWDA shall have a comprehensive understanding of all relevant regulations and guidelines, including those related to environmental impact assessment, waste management, water quality, noise and vibration pollution control, and others listed in the Environmental Management and Coordination Act (EMCA, 1999).
2. **Compliance with Waste and Water Management Standards**: the proponent must ensure compliance with waste management standards (Legal Notice 121) and water management standards (Legal Notice 120) as part of the project development process. This will include adopting appropriate waste management practices and ensuring that the quality of water discharged from the sewer system meets regulatory standards.
3. **Addressing Noise and Vibration Pollution**: The development must also adhere to regulations related to noise and excessive vibration pollution control during the construction and operation of the sewer system. This will include implementing measures to minimize noise and vibration disturbances to surrounding communities.
4. **Alignment with National Policies and Strategies**: The implementing agency must ensure that the proposed Last Mile Connectivity for Chuka sewer system project aligns with national policies and strategies including the Kenya Vision 2030, the National Environmental Action Plan (NEAP), the Kenya National Policy on Water and Sanitation 2016, and the National Water Master Plan. This will ensure that the project contributes to broader national development objectives and priorities.

The African Development Bank (AfDB) operates various Operational Support Services (OSSs) to enhance development across the African continent. These services are designed to support projects and initiatives in different categories, addressing diverse developmental needs. The Operational Support Services provided by the African Development Bank are applicable across various project categories, including infrastructure development, agriculture, health, education, water and sanitation, energy, and private sector development, among others. The goal is to address the diverse development challenges faced by African countries and contribute to sustainable and inclusive growth across the continent.

AFDB classifies a proposed project into one of four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts. This project falls under category B and hence the proponent involved environment experts to help prepare a project environmental impact assessment report.

Some of the Operational Safeguards found relevant to the project include:

OS 1: Assessment and Management of Environmental and Social Risk and Impact. The Chuka sewer project has undergone an Environmental and Social Impact Assessment adhering to the guidelines set by NEMA and the AfDB Operational Safeguards. All stakeholders, including Project Affected Persons (PAPs), were actively engaged throughout the assessment process. This resulted in the development of an ESIA report and an Environmental and Social Management Plan (ESMP) to effectively manage and mitigate all project-related impacts.

OS 2: Land Acquisition, Restrictions on Access to Land and Land Use, and Involuntary Resettlement To avoid involuntary resettlement, the Chuka sewer project has utilized existing road reserves for infrastructure development. Additionally, a Resettlement Action Plan (RAP) has been devised to address any potential impacts on PAPs, ensuring fair compensation where necessary.

OS 3: Habitat and Biodiversity Conservation, and Sustainable Management of Living Natural Resources the ESIA process for the Chuka sewer project included an assessment of its impact on biodiversity and ecosystems. Mitigation measures outlined in the ESMP aim to minimize adverse effects on flora and fauna within the municipality. The project has been designed to have minimal impact on environmentally sensitive areas, with safeguards in place to protect vulnerable ecosystems.

OS 4: Resource Efficiency and Pollution Prevention and Management A Waste Management Plan and an Effluent Discharge Control Plan have been developed for the Chuka sewer project to ensure efficient waste reduction, segregation, collection, and disposal practices. Solid waste generated during sewage treatment will be recycled through composting and sold as manure, promoting resource efficiency. Effluent water will undergo rigorous testing before release into the environment or for irrigation purposes, adhering to international best practices.

OS 5: Labour and Working Conditions Stringent measures will be enforced by the contractor to prioritize the health and safety of all employees involved in the Chuka sewer project. Special attention will be given to vulnerable groups, such as women, persons with disabilities, and youth, to ensure they are not exploited and are provided with necessary support in accordance with relevant regulations.

Summary of Public Participation

Adhering to the Environmental (Impact Assessment and Audit) Regulations of 2003 and the AfDB Operational Safeguard 1, the study incorporated public consultation to ensure the involvement of all stakeholders throughout the project's lifecycle, from planning to decommissioning. Public participation aimed to integrate public values, concerns, and preferences into decision-making processes, promoting transparency and accountability.

Various methods were employed to engage stakeholders, including direct interviews, observations, questionnaire administration, stakeholder workshops, and public

meetings. Key stakeholders consulted included the project proponent, Tharaka Nithi County Government officials, public administration representatives, and the general public. Structured questionnaires were also circulated, and interviews conducted with relevant officers and community leaders to gather feedback and opinions.

Table 0-1: Category of Stakeholders consulted during the public participation

Category of stakeholder	Stakeholder consulted
Project Proponent	• TWWDA staff
Tharaka Nithi County Government	• County Executive (Ministry of Environment, Water and Natural Resources) • NIWASCO
Public Administration	• County Commissioner • DCC Maara • ACCs • Chiefs
General public	• Community barazas
Key Ministries and related agencies	• Tana Water Works Development Agency • Water Resources Authority • Public Health & Sanitation • Lands office • Ministry of lands • Directorate of Occupational Health and Safety Services

Public consultation meetings were held on February 14th and 15th, 2024, at Ndagani Chief's Office and Chuka Water Office, respectively. These meetings aimed to facilitate meaningful engagement among diverse participants, including project affected persons, community members, administrative authorities, and local representatives. Objectives included informing locals about the project, seeking views and concerns, and incorporating feedback into the environmental impact assessment report.

Table 0-2: Summary of public participation attendance

DATE	VENUE	INTEREST	MALE	FEMALE	TOTAL
14th, Feb 2024	Ndagani Chiefs Office	Project Affected Persons and the Community	6	9	15
15th, February 2024	Chuka Water Office	Project Affected Persons and the Community	26	12	38

Feedback received during consultations highlighted widespread support for the project, emphasizing its crucial role in improving sanitation, hygiene, and overall quality of life. Concerns raised included inquiries about compensation for affected individuals, prioritization of local labour force, potential environmental impacts, and safety measures

during project implementation. Responses from the technical team addressed these concerns, ensuring transparency and accountability in project execution.

Table 0-3: Summary of issues and concerns raised in the public participation

Issue/Concern	Technical Team Response
Inquiry about compensation of affected individuals	Compensation for all directly affected persons will be diligently provided following the Resettlement Action Plan to be developed by the consultant.
Question regarding prioritization of local labour force	In efforts to stimulate the local economy, the contractor will prioritize hiring locals, particularly for unskilled positions.
Concern regarding the economic viability of land parcels after pipeline installation	Community members were assured that agricultural activities could continue on their land parcels post-installation, focusing on shallow-rooted crops like maize and beans. No structures will be permitted along the pipeline route to facilitate operational maintenance.
Dust pollution during excavation	The contractor will employ road sprinkling with water to mitigate dust pollution during project construction.
Noise pollution from project activities	The contractor will limit site activities during daytime, especially in sections with heavy machinery use, to minimize noise disturbance.
Accident prevention	The proponent will implement adequate safety measures for contractors and workers throughout project implementation.
Maintenance of excavated trenches	Trenches will not be left unattended to prevent accidents and hazards.
Pipeline passing through private land	The project will utilize road reserves to minimize compensation issues associated with private land passage.

A grievance redress mechanism structure was established to address complaints and conflicts arising from project implementation. This three-level mechanism includes community, county, and Commission on Administrative Justice (CAJ) levels, ensuring comprehensive resolution of grievances at different administrative levels

Summary of Positive Impacts.

Employment opportunities to the local people. Temporary job opportunities shall be available during the construction phase of the project and shall include casual laborers, food catering, artisans, etc. This shall be an important positive impact to the community since unemployment has been cited as one of the most pressing problems in Kenya today.

Creation of market for construction materials. The Project will require construction materials, some of which will be sourced locally and some internationally. These include cement, sand, coarse aggregates, pump sets, steel pipes, valves, and chemicals. These will provide a ready market for suppliers in and outside the project area.

Improved Sanitation: By providing access to proper sewage disposal systems, the project will improve overall sanitation levels in the community, reducing the risk of waterborne diseases and improving public health.

Environmental Protection: Proper disposal of sewage will prevent contamination of nearby water sources and Chuka hence reducing environmental pollution, preserving the local ecosystem and biodiversity.

Enhanced Quality of Life: Access to adequate sanitation facilities will contribute to a better quality of life for residents by ensuring a clean and healthy living environment.

Economic Development: Improved sanitation infrastructure will attract investment and promote economic development by enhancing the baseline infrastructure within the area for businesses and residents alike.

Social Equity: The project promotes social equity by ensuring that all members of the community, regardless of their socio-economic status, have access to essential sanitation services.

Sustainable Development: By providing sustainable sewage disposal solutions, the project will support long-term development goals, ensuring the well-being of current and future generations.

Summary of Negative Impacts

Pre-Construction Phase

- Loss of livelihoods due to the acquisition of way leaves for the sewer systems through the road reserves where some of the residents used it for business, agriculture and other forms of livelihoods
- Conflicts arising from compensation mainly due to inequality and inappropriate favours during compensation process
- Social disruption and displacement due to displacement brought by acquisition of way leaves reducing the common social ties within the locality.
- Labour related conflicts during workforce recruitment (discrimination, child labour engagement etc)

Construction Phase

- Disruption of road and service utilities mainly at the road crossings and whenever the proposed sewer lines come in contact with footpaths designated for NMT in Chuka town
- Access Limitation due to closures erected to allow the works mainly at access points
- Traffic Congestion along the major routes in Chuka and Ndagani where the proposed works might require road closure

- Health and safety Concerns along the proposed sewer lines. The ain hazards foreseen include: falls due to excavated ditches, traffic accidents due to heavy machinery, manual handling, trips and slips and falls
- Air quality Degradation brought by dust and fumes from machinery during construction
- Noise and vibrations brought by movements of heavy machinery and equipment
- Gender-based violence, harassment and abuse due to changes in social structures
- Spread of HIV/AIDS, STDs
- Conflicts amongst workers and local communities mainly due to infringement of scarce resources
- Poor hygiene and sanitation due to increased pressure to sanitation facilities
- Loss of Biodiversity in particular areas of interest where intense vegetation clearance will be done
- Waste generation mainly from debris, plastic packaging and pipe cuttings
- Interference with utilities i.e., Blockage of drainage systems along the roads and disruption of water supply systems due to excavation along the utilities
- Water pollution brough by oil spills and other pollutants from the construction sites being dumped into the aquatic ecosystems
- Soil Erosion due to destabilization of soil profiles during excavation

Operation Phase

- Odour mainly at the WSTP due to increased waste water
- Encroachment of way leave by the residents for business and agricultural livelihood activities leading to consequential damage of sewerage property
- Vandalism of sanitation facilities mainly for scrap business
- Social Disruptions due to changes in social structures
- Occupational health and safety concerns during maintenance
- Contamination of Water Sources
- Infrastructure Damage and disruption during repairs and maintenance

ESMP

Table 0-4: Summary of negative impacts with mitigation measures

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Pre-Construction Phase					
Loss of livelihoods	High	• Prepare a comprehensive Resettlement Action Plan (RAP) for purposes of compensation for land, assets and crops for the Project Affected Persons (PAPs) • Prepare a Grievance Redress Mechanism (GRM) to guide all grievances and complaints emanating from compensation issues • Providing fair and timely compensation to displaced persons, including compensation for lost land, property, and livelihoods. • Offering support services such as training on financial management • Implementing transparent and accountable grievance redress mechanism to address concerns and disputes related to displacement effectively	TWWDA Consultant Team	• Minutes of PAPs consultation meetings • Comprehensive RAP Report • Grievance Redress Mechanism • RAP Implementation Report	750,000
Conflicts arising from compensation	High	• The proponent to facilitate open dialogue and consultation with affected communities throughout the project life-cycle. • Timely compensation in line with the agreements before the start of the project • Implementation of the developed project grievance redress mechanism to address disputes and grievances arising from the project	TWWDA	• RAP implementation report capturing the status of compensation	N/A

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Construction Phase					
Labour related conflicts during workforce recruitment (discrimination, child labour engagement etc)	Medium	• Priority of employment to be given to the local people • Contractor to ensure equal opportunities in labour engagements for both men and women • Contractor to adhere to the requirements of the Employment Act, Section 38 by keeping records of all workers engaged indicating date of employment, name, national ID number, age, sex, hours of work and wages paid • Implementation of the project Grievance Redress Mechanism (GRM) • Sensitization of workers on the project Grievance Redress Mechanism (GRM)	TWWDA Contractor Resident Engineer	• Staff records • Records of grievances resolved	350,000
Disruption of road and service utilities	Medium	• The client to seek necessary permits from authorities such as KERRA and KURA • Conduct thorough utility mapping to identify the location of existing utilities to avoid heavy excavation along the utility routes. • Coordinate with utility providers to ensure a clear understanding of the location and depth of utilities to avoid accidental damage during construction. • Utilize trenchless methods such as horizontal directional drilling (HDD) or pipe jacking to install sewer lines without extensive excavation more so on road crossings.	• TWWDA • Contractor	• Permits • Availability of safety signage in affected road sections	200,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		• The contractor should restore any damaged service utility within the shortest time possible utmost threshold of 6 hours within damage time • Relocate or protect vulnerable utilities that intersect with the planned sewer line route. • Provide advanced notification to utility providers, residents, and businesses about planned construction activities that may impact utilities. • Maintain open communication channels to address concerns through the GRM and coordinate any necessary adjustments to utility services during construction. • Establish protocols for immediate response, repair, and restoration of utility services to minimize downtime and inconvenience. • Conduct regular monitoring and inspection of construction activities to ensure compliance with utility protection measures. • Provide training and education to construction crews on the importance of utility protection and the proper procedures for working near existing utilities			
Access Limitation	Medium	• Identify and establish alternative access routes to mitigate limitations caused by construction activities. • Implement temporary access arrangements, such as temporary roads	• Contractor	• Access paths and well communication structure and notices	150,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		or pathways, to maintain access to affected areas during construction. • Coordinate with local authorities to ensure the safety and functionality of temporary access routes. • Establish scheduled access periods to allow residents, businesses, and emergency services uninterrupted access to affected areas. • Appoint community liaison officers to facilitate communication between construction teams and affected stakeholders. • Provide designated pedestrian pathways and crossings to ensure safe access for pedestrians in areas affected by construction. • Provide regular updates and communication to affected stakeholders regarding access limitations, alternative routes, and construction progress			
Traffic Congestion	Medium	• Utilize trenchless methods such as horizontal directional drilling (HDD) or pipe jacking to install sewer lines without extensive excavation more so on road crossings. • Implement traffic control measures, such as temporary traffic signals or flaggers, to manage traffic flow in areas with access limitations. • Ensure proper signage and markings to guide motorists and pedestrians safely through construction zones.	• Contractor • TWWDA	• Traffic flow along the major trunks	100,00

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		• Schedule construction activities during off-peak hours or weekends to minimize disruptions to peak traffic flow. • Install temporary traffic control devices including cones, barricades, and signage to guide motorists safely through construction zones. • Deploy trained flaggers and traffic wardens to manage traffic flow and ensure safe passage through construction areas. • Provide regular updates on construction progress and anticipated traffic impacts to foster community understanding and cooperation. • Phase construction activities to minimize the length of road closures and lane restrictions, reducing overall disruption to traffic flow			
Health and safety Concerns	High	• Ensure that all construction machines and equipment are in good working conditions to prevent occupational hazards during excavation activities and laying of the pipes; • Establish a Health and Safety Plan for civil works areas ensuring the working hours are controlled and that employees are not allowed to extend the working hours beyond an acceptable limit for purposes of gaining extra pay; • Provide adequate manual labour to meet the requirements of the tasks;	• TWWDA • Contractor • Resident Engineer	• Availability of PPEs and first aid kits • Availability of safety signage in appropriate areas • Availability of a Health and Safety Action Plan • Attendance list for toolbox talks	5,000,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		• Appoint a trained health and safety team for the duration of the construction work, monitor and advise appropriately on health and safety matters during the rehabilitation activities • Provide workers with gloves, ear gears, sturdy rubber boots and overalls to protect their skin from the effects of cement; • Provide workers training on safety procedures and emergency response such as fire and sewer pipe bursts		• Up to date record for near misses, injuries and fatalities	
Air quality Degradation	Low	• Vehicles and site trucks should be driven under the recommended speed of 40Km/h within public areas such as schools, and markets • Sprinkle water on degraded access routes to reduce dust emission during transportation of materials to project sites • Provision of dust masks to workers working in dusty environs	TWWDA Contractor Resident Engineer	Adequate PPEs to workers Records of traffic accidents involving site vehicles	250,000
Noise and vibrations brought by movements of heavy machinery and equipment	Low	• Implement noisy construction activities during off-peak hours to minimize disruption to nearby residents. • Erect noise barriers or soundproofing materials around the construction site or camp areas to contain noise. • Regularly maintain and lubricate construction equipment to reduce noise emissions. • Schedule noisy activities for specific times of the day when noise impacts are	TWWDA Contractor Resident Engineer	• Vehicle maintenance records • Availability of PPEs such as ear plugs	45,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		expected to be lowest preferable 8AM – 5PM. • In areas surrounding schools and institutions of learning schedule activities to weekends mainly • Communicate with nearby residents about the construction schedule and anticipated noise levels. • Implement noise monitoring programs to track noise levels and ensure compliance with regulations. • Provide ear protection for workers to minimize their exposure to construction-related noise. • Designate specific areas within the construction site for noisy activities to minimize impacts on nearby residents			
Gender-based violence/harassment/abuse	Low	• All cases of gender-based violence (GBV) to be reported, investigated and resolved • Sensitisation of workers on issues of GBV	Contractor Resident Engineer	GBV Reports Training Reports	75,000
Spread of HIV/AIDS, STDs	Medium	• Worker's sensitization on HIV/ AIDs and other STDs • Provision of condoms to workers • Distribution of HIV & AIDS awareness materials in collaboration with National Aids Control Council (NACC)	Contractor Resident Engineer	Records of toolbox talks	250,000
Conflicts amongst workers and local communities	Low	• Develop a GRM for workers • Sensitization of workers on the project GRM and necessary procedures	TWWDA Contractor Resident Engineer	Training reports Grievance reports	250,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Fire risks	Medium	• Provision of firefighting appliances in offices, stores, site vehicles • Regular training on fire risk reduction to workers during tool box talks	Contractor Resident Engineer	• Availability of firefighting appliances • Records of tool box talks	120,000
Poor hygiene and sanitation	High	• Provision of clean drinking water and sanitation facilities to workers at the work place • Provision of mobile toilets and water for sanitation purposes	Contractor Resident Engineer	Availability of clean drinking water and sanitation services on site	50,000
Loss of Biodiversity	Medium	• Cultural and environmentally significant trees must be avoided at all costs. • Whenever feasible, the contractor should selectively remove mature, native trees and vegetation. • Unused areas around the project site will be restored to their original condition and enhanced with aesthetic appeal through the planting of indigenous trees. • The site should be re-vegetated once site withdrawal is complete and choice of species should be as close to the previous species as possible •	• TWWDA • Contractor •	County of trees lost and the vegetative cover	100,000
Waste generation	High	• Implement a waste management plan to minimize waste generation during the construction phase. • Prioritize the use of materials with minimal packaging to reduce waste. • Encourage the reuse and recycling of construction materials whenever possible.	• TWWDA • Contractor • Resident Engineer	Availability of a solid waste management plan	350,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		• Train workers on proper waste handling and disposal techniques to minimize waste generation. • Utilize construction techniques that generate less waste, such as prefabrication and modular construction. • Implement on-site segregation of waste to facilitate recycling and proper disposal. • Partner with local recycling facilities to responsibly dispose of construction waste. • Regularly monitor waste generation and adjust strategies as needed to minimize environmental impact. • Promote awareness among workers and contractors about the importance of waste reduction and responsible disposal practices. • Incorporate incentives or rewards for individuals or teams that successfully reduce waste generation on-site.			
Interference with utilities i.e. • Blockage of drainage systems; • Excavation for creation of access routes and related structures.	Low	• The structures to be developed should be aesthetically acceptable to blend in with the surrounding; • The proponent shall as much as possible complete the works in such a way that natural aesthetics shall be retained at the locations • Restoration shall be undertaken to ensure that the original setting is as much as possible retained	• TWWDA • Contractor • Resident Engineer	Restored/ rehabilitated sites	N/A

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Water pollution	High	• Isolate solid wastes disrupted from the works during excavations for safe disposal. The wastes should be collected and disposed in approved sites • Earth moving and excavations for the construction are carried out considering safety of the river and surface drainage. Control siltation of rivers and other surface drains • Ensure spilt oil does not discharge into water sources Provide oil spill containment including concrete platform for servicing of construction equipment and holding of scrap oil drums.	Contractor Resident Engineer	Water quality tests	60,000
Soil Erosion	Medium	• Re-plant the indigenous vegetation as much as practical once work is completed • Limit vegetation clearance unless where unavoidable circumstances appear; • Contain excavated soils so that they will not find their way into nearby water sources; • Cement mixing should be done in a designated area away at a safe distance from storm water drains; • Spilled cement or concrete should be collected and disposed away from natural water ways or storm water drainage; • Sensitise workers and enable them to properly handle concrete spillages or waste cement;	Contractor Resident Engineer	• Rehabilitated sites • Incidents of soil erosion reported	30,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		• Re-vegetation of exposed areas around the site should be carried out rapidly in order to mitigate against erosion of soil through surface water runoff and wind erosion			
Operation Phase					
Odour	High	• Proper maintenance of the sewer infrastructure • Regular patrols to supervise leakages • Installation of leak detectors	NIWASCO	• Number of complaints on leakages	Operational Costs
Encroachment of wayleave	High	• Mapping and installation of beacons which illustrate the width of the pipeline reserve • Regular patrol of the pipeline corridor for encroachment • Prosecution of encroachers as required by County By-Laws on way leaves and road reserves maintenance. • Conduct public sensitization programs on way leave protection	NIWASCO	• Well maintained wayleave	To be determined
Vandalism	High	• Put in place proper security measures to guard the infrastructure and reduce cases of vandalism • Regular sensitisation of local community on importance of protection of the water infrastructure • Activate a community watch group for information sharing on the status of the sewer pipeline	TWWDA NIWASCO	Sensitisation Meetings and minutes	To be part of operational costs
Social Disruptions	Medium	• Engaging with the community through effective communication channels, providing timely updates on maintenance schedules, and addressing	NIWASCO	Engagement minutes	To be part f the operational costs

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		any concerns or complaints promptly can help minimize social disruptions. • Involving local community members in the planning and decision-making processes related to sewerage system operation can foster a sense of ownership and cooperation			
Occupational health and safety risks	High	• 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 • Provision of adequate PPEs to all workers e.g., safety shoes, helmets, gloves, overalls, dust masks etc • Display of appropriate safety signage to enhance awareness creation on the potential hazards involved during decommissioning • Provision and display of emergency contacts in appropriate areas • Provision of a well-stocked first aid kit at all active sites and regular training of workers on basic first aid procedures • Acquisition of WIBA Insurance for all workers as per Work Injury Benefits Act, 2007	TWWDA Contractor NIWASCO	• Availability of PPEs and first aid kits • Availability of safety signage in appropriate areas • Records of Tool box talks • Attendance list	To be determined during development of a decommissioning plan
Contamination of Water Sources	High	• Implementing regular monitoring programs to detect leaks • Promptly repairing any damaged or leaking sewer lines can help prevent contamination of water sources.	NIWASCO	• Water Quality tests	TO be part of operational costs

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		• Ensuring that sewage treatment plants are operating effectively can reduce the risk of contamination.			
Infrastructure Damage and disruption during repairs and maintenance	High	• Proper planning of maintenance activities to minimize disruptions to traffic flow, • Timely repairs of any damages caused to roads or infrastructure, can help mitigate this impact. • Implementing traffic management plans and providing advance notice to residents about planned	NIWASCO	• Number of disrupted services	Be part of operational costs
Decommissioning Phase					
Loss of jobs and income	High	• Notify the employees in advance on the Project closure date and adequately compensate them; • Dismissal procedures to be compliant with Employment Act, 2007; • Provide counselling & alternative skills for alternative activities; • Employer should find alternative means of livelihood for the staff who were employed at the sewerage project where possible.	TWWDA NIWASCO	Notice to employees	N/A
Air pollution	Low	• Speed control of site vehicles to a max of 40kph • Water should be sprayed on dusty excavated areas • Provision of dust masks to workers for use when working in dusty conditions • Use of serviceable vehicles and machinery to avoid excessive smoke emission	TWWDA NIWASCO Contractor	• Adequate PPEs to workers • Records of traffic accidents involving site vehicles	To be determined during development of a decommissioning plan

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Water Pollution	High	• Implement a comprehensive waste management plan to handle, store, and dispose of materials and waste properly. • Minimize the use of harmful chemicals or substances during decommissioning. • Develop spill prevention and response protocols to handle any accidental releases of pollutants	TWWDA NIWASCO WRA Contractor	• Water quality tests	To be determined during development of a decommissioning plan
Noise and vibrations	Low	• Schedule noisy activities during the day time period • Use silencers on machines where possible; • Ensure machinery is well maintained to reduce noise emitted	TWWDA NIWASCO Contractor	NEMA license	To be determined during development of a decommissioning plan
Solid waste generation	Low	• Disposal of solid waste in compliance with EMCA 2006 Waste Management Regulations; • Segregation of waste to encourage reuse and recycling; • Engagement of a registered waste handler	TWWDA Contractor NIWASCO	Contracts and Licenses of the waste handler Waste recycling plan	To be determined during development of a decommissioning plan
Disruption of ecosystems	Medium	• Restore the land to its original state by revegetating the surrounding • Development of a decommissioning plan to take care of the native ecosystem • Conduct biodiversity assessment before decommissioning • Unnecessary cutting down of trees should be avoided	TWWDA NIWASCO Contractor	Tree and vegetation lost count	To be determined during development of a decommissioning plan

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Visual and aesthetic impacts	Medium	Rehabilitate/restore the site to its original state	TWWDA NIWASCO Contractor	Restored/ rehabilitated sites	To be determined during development of a decommissioning plan

ESMMP Implementation Plan

The responsibility of implementing the ESMMP primarily falls on the project management team, comprising the project proponent, contractors, and relevant stakeholders.

The Key aspects of the responsibility include:

- Overseeing the execution of mitigation measures,
- Allocating resources for monitoring and training,
- engaging with stakeholders to address concerns and gather feedback.
- ensuring compliance with environmental regulations,
- fostering a culture of continuous improvement through regular reviews and evaluations to enhance environmental and social performance throughout the project lifecycle.

To ensure the effective implementation of the Environmental and Social Management and Monitoring Plan for the Chuka Sewer LMC project, it is crucial to delineate the roles and responsibilities of various entities involved. The table below outlines these roles and responsibilities:

Table 0-5: Roles and Responsibilities in ESMMP Implementation for Chuka Sewer LMC

Entity	Roles and Responsibilities in ESMMP Implementation
Tana Water Works Development Agency (TWWDA)	• Ensure that all project operations comply with internal environmental policies and the ESMMP. • Obtain all necessary authorizations, approvals, and licenses for project implementation. • Ensure that the Environmental Management Plan (EMP) is an integral part of the contract document with the Contractor and oversee its implementation. • Establish institutional linkages with relevant parties in project implementation as needed. • Conduct regular inspections of project activities to ensure compliance with social, health, safety, and environmental standards. • Address any non-conformity with the ESMMP attributable to the Contractor and take corrective actions as necessary.
National Environmental Management Authority (NEMA)	• Regulatory oversight to ensure compliance with environmental laws and regulations. • Coordinate environmental management activities and promote the integration of environmental

Entity	Roles and Responsibilities in ESMMP Implementation
	considerations into project policies, plans, and programmes. • Identify projects and programmes requiring environmental audits or monitoring under applicable laws. • Monitor and assess project activities to prevent environmental degradation.
Nithi Water and Sanitation Company (NIWASCO)	• Operate and maintain the sewage system to reduce non-revenue water. • Manage and respond to sewer spills, disinfect affected areas, and ensure proper environmental clean-up. • Conduct effluent quality analysis in collaboration with relevant government agencies. • Ensure treated wastewater and sludge meet health standards for reuse or disposal. • Regularly monitor and inspect facilities to prevent interference and maintain compliance with effluent discharge standards.
Contractor	• Develop and implement an ESMP implementation plan and health and safety plan within 30 days of contract signing. • Operate with valid licenses, approvals, and authorizations for project activities. • Prevent accidents and respond to incidents that may cause environmental damage. • Ensure compliance with environmental requirements and health and safety standards established in the contract. • Minimize environmental damage, waste, pollution, and impacts on surrounding areas and the public. • Provide appropriate Personal Protective Equipment (PPE) to workers and manage the complaints process.
Supervising Consultant/Resident Engineer	• Ensure the ESMMP is up-to-date and utilized by the contractor. • Conduct periodic audits of the ESMMP to verify its performance and compliance with expectations.

Entity	Roles and Responsibilities in ESMMP Implementation
County Government of Tharaka Nithi	• Provide necessary permits and advisory services to project implementers as required during project implementation.
Directorate of Occupational Safety and Health Services (DOSHS)	• Register the project site as a work station and enforce relevant provisions of occupational safety and health laws.
Water Resource Authority (WRA)	• Monitor and enforce conditions attached to water permits and use. • Regulate and protect water resources quality from adverse impacts. • Regulate and protect water resources infrastructure, use, and effluent discharge. • Collaborate with beneficiary communities to manage and protect water catchments. • Establish water resources monitoring networks to ensure sustainability and environmental protection.

Conclusion and Recommendations

Based on the ESIA findings, it was concluded that the proposed Chuka Sewerage LMC Project holds significant potential for enhancing sanitation systems in the area. While the project is anticipated to have adverse social and environmental effects, particularly during construction, the positive impacts outweigh the negatives during the operational phase. Most adverse effects are deemed temporary and manageable with recommended mitigation measures. The identified negative impacts are mostly moderate or lower in severity and can be effectively addressed. It is advised that the project is approved subject to adherence of the ESMMP and the following recommendations:

- The proponent and the project coordination unit should ensure active involvement of local community, government agencies, and other relevant stakeholders throughout the project lifecycle.
- The proponent should implement a robust environmental monitoring program to track and assess the impacts of construction and operation activities on air, water, soil quality, and biodiversity.
- Effective mitigation measures to minimize environmental degradation, including erosion control, waste management, and habitat restoration, should be conducted throughout the phases in accordance with regulatory requirements.
- The project coordination unit and the contractor shall ensure strict compliance with environmental regulations and standards by conducting regular audits, inspections, and assessments during construction and operation phases.
- The contractor shall prioritize worker safety and health by providing adequate training, personal protective equipment and emergency response procedures to mitigate risks associated with construction activities.

- The proponent in conjunction with the contractor shall foster positive community relations by addressing concerns, providing timely information, and implementing measures to minimize disruptions to local communities during construction and operation through the GRM.
- NIWASCO the water service provider who the project shall be bestowed upon, should establish a post-construction monitoring program to assess the long-term impacts of the project on the environment, social fabric, and local economy, and implement adaptive management strategies as needed.
- TWWDA in collaboration with NIWASCO should invest in capacity building initiatives to enhance local skills and expertise in environmental management, construction techniques, and operation maintenance to ensure the sustainability of the project beyond its completion

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1. CHAPTER ONE: INTRODUCTION

1.1. Background

The Government of Kenya has prioritized the mainstreaming of its National Water Policy to ensure universal access to safe water and sanitation facilities by 2030. This initiative aims to enhance public health, improve quality of life, and alleviate poverty through the sustainable provision of water and sanitation services. The proposed project in Chuka town aligns with these objectives, focusing on enhancing water supply and sanitation services in Chuka and Chogoria towns and their surrounding areas within Tharaka Nithi County. By promoting better hygiene practices and creating a healthier environment, the project contributes to the overall well-being of the community.

Sewerage systems play a crucial role in sustainable urban living by offering several advantages. They safeguard public health by effectively managing and treating wastewater, thus reducing the risk of waterborne diseases and improving overall hygiene standards. Proper sanitation infrastructure enhances environmental sustainability by preventing pollution of water bodies and preserving natural resources. Communities can mitigate environmental degradation and protect ecosystems for future generations by investing in sewerage systems as a crucial infrastructure within urban areas.

Generally, sewerage systems contribute to economic development by supporting urban growth and facilitating industrial activities. Improved sanitation infrastructure attracts investment, enhances property values, and fosters economic opportunities in construction, maintenance, and operation of sewer networks. Moreover, access to reliable sewerage services enhances the liveability of urban areas, attracting businesses, tourists, and skilled professionals, thereby promoting economic growth and prosperity.

Currently, the sewerage system in Chuka Town is nearing completion, with the predominant use of on-plot sanitation systems such as pit latrines and septic tanks for effluent disposal. A decentralized sewage facility, capable of handling 22 cubic meters per day, including septic tanks, an anaerobic baffled reactor, and a constructed wetland, was commissioned in January 2017. However, it remains underutilized due to challenges like the absence of a sewage exhauster by NIWASCO, limited public awareness, and inadequate public health enforcement.

The augmentation and reticulation to Chuka Town's water supply system between 2018 and 2020, involving the creation of more water sources and the expansion of distribution networks, have made existing on-site sanitation systems inadequate. This shortfall could pose risks to both public health and the environment. Therefore, it is crucial to urgently develop a water-borne sanitation system that is environmentally sustainable to address these emerging challenges effectively. Tana Water Works Development Agency is therefore planning to implement the last mile connectivity of the Chuka sewerage system under the National Urban Water Suppl and Sanitation Program. The project will entail installation of Tertiary Sewers of diameter 225mm over an approximate length 9.5Km within Chuka.

1.2. Rationale of the ESIA

The Environmental and Social Operating Standards (E&S OSs) within the African Development Bank Group's Integrated Safeguards System 2013 delineate the obligations of Borrowers in recognizing and evaluating environmental and social risks linked to projects funded by the Bank. Similarly, the Kenyan environmental legislation particularly the Environmental Management and Coordination Act of 1999 (EMCA 1999) and its subsidiary laws, mandates that all development projects undergo an Environmental and Social Impact Assessment during the planning phase. This assessment is crucial for ensuring thorough evaluation of significant impacts on both the natural and social environment throughout the entire life cycle of the project, spanning its conception, construction, operation, and eventual decommissioning. Adhering to these mandates is crucial to maintain environmental and social standards and mitigate adverse effects on communities and ecosystems.

In pursuit of project funding and eventual implementation, TWWDA, the project proponent for the Chuka Sewer LMC, commissioned an Environmental and Social Impact Assessment for the proposed project. This project report serves as a vital precursor to securing funding and ensuring the project's alignment with regulatory frameworks, encompassing both national legislation and international standards. The ESIA was conducted in accordance with guidelines set by the National Environment Management Authority (NEMA) and in compliance with the policies established by potential project financiers, such as the African Development Bank (AfDB). The report provides background details of the project, alongside a comprehensive assessment of the anticipated environmental and social impacts associated with the sewerage development. Furthermore, it outlines a series of mitigation measures aimed at effectively addressing and alleviating these impacts.

1.3. The objectives of Environmental and social Impact Assessment (ESIA)

The primary objective of the ESIA study was to evaluate the impacts of the proposed development in relation to the environment i.e., physical, biological, and social-economic environments. It aims at enhancing the proposed development co-existence and compatibility with the surroundings environment by ensuring sustainable environmental management during the entire project's life cycle.

The scope of this environmental and social impact assessment covered the physical extent of the project, site location and its immediate environs, construction phase of the project, Operation phase and decommissioning phase. All these were done in light of relevant standards, legal and regulatory framework. The interaction of the sewerage project pipeline with Flora and fauna; Land use; Socio-economic aspects; disease outbreak and response preparedness; mosquito breeding site and flooding were also assessed. Finally, a detailed evaluation of the project`s potential environmental and social impacts was done with mitigation measures being suggested accordingly. The output of this study was this Environmental Impact Assessment study report, to be submitted to NEMA for the purposes of seeking an EIA license in accordance to EMCA, CAP 387.

1.4. ESIA approach and methodology

This study process adopted an integrated approach where data and information evaluation, field investigations, consultations among the team of experts, interviews and discussions with stakeholders and affected parties were undertaken at the same time.

Physical evaluation of the area was also carried out with specific focus on the biophysical and socio-economic environments. The sensitive environmental receptors, biodiversity, land use and development trends, hydrology, physiographical features and climatic conditions along the project route were evaluated and analysed. The social and economic status was also evaluated through organized consultative meetings at the administrative and communal levels in order to collect perceived information on the impacts associated with biophysical and socio-economic dimensions of project implementation.

The ESIA study team made field visits to the proposed site and conducted desktop study to establish the following: Baseline data which included; biodiversity, socio-economic and environmental assessment legal Policies, Legislative and Institutional Framework governing the proposed project, Perception of the proposed project from the local communities

Compatibility of the proposed project with the environment, Types of waste to be generated, proposed management and disposal methods, Potential positive and negative impacts of the project.

The study assessed and quantified the possible impacts of the proposed project to the residents in general and other administrative areas that share resources with the project beneficiaries.

1.4.1. Site Visits

Information gathering was conducted through site visits at the project and its surrounding areas including households. This involved a systematic field traversing to quantify perceived impacts of project on: -

- Existing land uses
- Land conflicts and ownership
- Areas of insecurity
- Institutions and organizations in the area
- Vegetation cover of the area
- Existing sensitive environmental receptors including underground and surface waters; animal feeding grounds and routes, and methods of protection from destruction, interference, contamination and extinction
- Waste management and disposal methods

1.4.2. Public Consultation

Consultative forums were held at the stakeholder's level and community level. At the community level meetings were held with the public administration, community elder's, religious leaders and the public at large. The community members.

1.4.3. Desktop Review

The team assembled existing literature in relation to the project, this included but not limed to: AfDB Operational Safeguards, maps, images and other relevant documents. The desk study aimed to bring into focus the basics of the assignment. The principal National legislation governing issues of environmental concern in Kenya is the Environmental Management & Coordination Act CAP 387 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. Projects likely to cause environmental impacts require that an environmental impact assessment report to be carried out. It is under this provision that the ESIA project report was undertaken.

2. CHAPTER TWO: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1. National Policies

2.1.1. National Water Policy 1999

The National Water policy was enacted in April 1999 as Sessional Paper No. 1 of 1999 calls for decentralization of operational activities from the central government to other sectors, including local authorities, the private sector and increased involvement of communities in order to improve efficiency in service delivery. It also tackles issues pertaining to water supply and sanitation facilities development, institutional framework and financing of the sector.

According to the policy, in order to enable sustainable water supply and sanitation services, there is need to apply alternative management options that are participatory through enhanced involvement of others in the provision of these services but particularly the private sector. The overall objective of the National Water Policy is to lay the foundation for the rational and efficient framework for meeting the water needs for national economic development, poverty alleviation, environmental protection and social wellbeing of the people through sustainable water resource management.

2.1.2. 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 economic and social developments anticipated by Vision 2030 will require more high-quality water supplies than at present.

The Vision 2030 goals for water and sanitation are to ensure that improved water and sanitation are available and accessible to all. The project aligns to the blue print as it enhances the accessibility of sanitation infrastructure to the people of Chuka

2.2. Legislative Framework

2.2.1. The Constitution of Kenya

The Constitution is the supreme law of the Republic and binds all persons and all State organs at all levels of government. The Constitution of Kenya, 2010 provides the broad framework regulating all existence and development aspects of interest to the people of Kenya, and along which all national and sectoral legislative documents are drawn. In relation to the environment, article 42 of chapter four, The Bill of Rights, confers to every person the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative measures, particularly those contemplated in Article 69, and to have obligations relating to the environment fulfilled under Article 70.

Chapter 5 of the document provides the main pillars on which the environmental statutes are hinged. Part 1 of the chapter dwells on land, outlining the principles informing land policy, land classification as well as land use and property. The second part of this chapter directs focus on the environment and natural resources. It provides a clear outline of the state's obligation with respect to the environment, thus; "The state shall-

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

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

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

2.2.2. The Environmental Management and Co-ordination Act (EMCA), CAP 387

This Act of Parliament, also known as EMCA, is the parent Act of Parliament that provides for the establishment of appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto. EMCA, in its 13 interrelated parts, provides regulatory provisions for all levels of environmental conservation and management. The first four parts provide legislative guidelines on administrative and planning components of environmental management. They include;

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

- Environmental quality standards.

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

Environment Tribunal, Environmental Offences

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

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

a. The Environmental (Impact Assessment and Audit) Regulations, 2003.

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

Relevance

The sewerage connection project as an activity is listed in the second schedule of EMCA as among projects that require an Environmental Impact Assessments before commencement. The project implementation cannot commence before the license is granted, upon conducting the ESIA. For this reason, this report provides the legal requirements for the project approval.

Impacts of the sewerage connection project, involves major elements of the environment, including land, water and human health and safety. Therefore, there is need to evaluate these impacts and establish the most sustainable approach to benefit both the current and the future generations, and mitigate projected negative impacts to people and the environment through conducting Environmental and Social Impact Assessment and subsequent audits.

b. The Environmental Management and Coordination (Water Quality) Regulations, 2006

Described in Legal Notice No. 120 of the Kenya Gazette Supplement No. 68 of September 2006, these regulations apply to drinking water, water used for industrial purposes, agricultural purposes, recreational purposes fisheries and wildlife and any other

purposes. It stipulates quality standards for sources and discharge of water to any environmental receptors within an activity area.

The Regulations outline various water quality standards in relation to use and discharge. Such aspects provided for are:

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

The proposed Last mile Connectivity of Chuka Sewerage Project will conform ti Schedule 3 which outlines the minimum chemical and physical thresholds that should be discharged in to the environment

c. Environmental Management and Co-ordination (Waste Management) Regulations, 2006

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

- Industrial wastes;
- Hazardous and toxic wastes;
- Pesticides and toxic substances;
- Biomedical wastes;
- Radio-active substances

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

Relevance

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

d. Environmental Management and Coordination (Fossil Fuel Emission Control) Regulations 2006

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

Relevance

The fossil fuels considered are petrol, diesel, fuel oils and kerosene. This will be applicable to equipment and machinery used in the project during construction phase of the project.

e. Environmental Management and Coordination (Noise and Excessive Vibration Pollution) Control Regulations, 2009

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

Relevance

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

2.2.3. Water Act, 2016

Water in Kenya is owned by the Government, subject to any right of the user, legally acquired. However; this Act regulates conservation and management of all water resources within the republic, and related purposes. This Act provides the legal framework for the regulation, management and development of water resources and water, and sewerage services in line with the Constitution. The Act gives provisions regarding ownership of water, institutional framework, national water resources, management strategy, and requirement for permits, state schemes and community projects. The act gives Mandate Water Resources Authority to manage and monitor all water related resources. The authority has authority over all works pertaining water resources including the proposed Sewer lines.

The proposed Last mile connectivity of the Chuka Sewerage project is a subsidiary of the large sewerage projects which complied with the Act by acquiring the necessary permits from the relevant bodies in relation to water resources.

2.2.4. Occupational Health and Safety Act, 2007

The Act provides for the safety, health and welfare of workers and all persons lawfully present at work place, as well as the establishment of the National Council for Occupational Safety and Health and for connected purposes.

Section 3(1) and (2) of the Act explains that it applies in all workplaces where any person is at work, either temporarily or permanently. It expounds on the purpose, which is to secure the safety, health and welfare of persons at work as well as protecting persons other than persons at work against risks resulting from, or connected to, activities at workplace. Further, sections 43 and 44 of part V give regulations on registration of work places.

Relevance

The project will require significant manpower to drive and will thus result in employment of quite a number of people. There will also be need for designated workplaces for operation. Thus, compliance with the relevant provisions in this Act will be vital in ensuring that workers operate in safe and healthy environment, and that their welfare shall be catered for. There will also be need for establishment of contractor's health and safety plan in line with this Act.

2.2.5. The Work Injury Benefits Act (WIBA), 2007

The WIBA Act provides for compensation to employees for work related injuries and diseases contracted in the course of their employment and for connected purposes. Section 7(a) of the Act, on the obligations of the employer, requires an employer to obtain and maintain an insurance policy with an insurer approved by the State in respect of any liability that the employer may incur under this Act to any of his employees.

Section 10(1) States that an employee who is involved in an accident resulting in the employee's disablement or death is subject to the provisions of this Act, and entitled to the benefits provided for under this Act. It also states expressly that an employer is liable to pay compensation in accordance with the provisions of this Act to an employee injured while at work.

On First Aid covered in section 45(1), an employer is supposed to provide and maintain such appliances and services for the rendering of first aid to his employees in case of any accident as may be prescribed in any other written law in respect of the trade or business in which the employer is engaged.

Relevance

As workers are employed by project contractors, they face myriad challenges to their health, safety and security, either from the equipment of use or work processes. WIBA offers legal backing on the incidents or accidents at the workplace or while on duty, including First Aid and compensation aspects. It is thus important to integrate the relevant provisions of this Act in the proposed project Activities.

2.2.8 Way Leaves Act (Cap. 292)

Way Leaves Act (Cap. 292) Section 3 of the Act states that the Government may carry any works through, over or under any land whatsoever provided it shall not interfere with any existing building or structures of an ongoing activity. Notice, however, will be given one month before carrying out any such works (section 4) with full description of the intended works and targeted place for inspection. Any damages caused by the works would then be compensated to the owner as per the section.

Section 8 states that any person without consent causes any building to be newly erected on a way leave, or cause hindrance along the way leave shall be guilty of an offence and any alterations will be done at his/her costs.

In accordance with the Act (section 4), notice will be given before carrying out works with full description of the intended works and targeted place for inspection. Any damages caused by the works would then be compensated to the owner as per this section.

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

The law prohibits various forms of sexual violence offences committed against men and women. These include rape, attempted rape, sexual assault, indecent acts, defilement, gang rapes, sexual harassment, child pornography, child prostitution, child sex tourism, exploitation of prostitution, incest, deliberate transmission of HIV and AIDS including other life threatening sexually transmitted diseases, and cultural and religious offences. According to section 4 (1) the Government shall promote public awareness about the causes, modes of transmission, consequences, means of prevention and control of HIV and AIDS through a comprehensive nationwide educational and information campaign conducted by the Government through its various Ministries, Departments, authorities and other agencies. Pursuant to subsection (2), the educational and information campaign referred to in subsection (1) shall- (a) Employ scientifically proven approaches; (b) Focus on the family as the basic social unit; (c) Encourage testing of individuals; and (d) be carried out in schools and other institutions of learning, all prisons, remand homes and other places of confinement, amongst the disciplined forces, at all places of work and in all communities throughout Kenya. Subsection (3) provides that in conducting the educational and information campaign referred to in this section, the Government shall collaborate with relevant stakeholders to ensure the involvement and participation of individuals and groups infected and affected by HIV and AIDS, including persons with disabilities. Section 31 (1) provides that, no person shall be- (a) Denied access to any employment for which he is qualified; or (b) Transferred, denied promotion or have his employment terminated, on the ground only of his actual or suspected HIV status. RVWSB will endeavour to promote educational and informational campaigns and organize for Voluntary Counselling and Testing throughout the project cycle. In addition, the proponent shall ensure that the contractors do not discriminate workers on the basis of their HIV status.

2.2.6. Climate Change Act 2016

The Climate Change Act of 2016 offers a regulatory framework aimed at strengthening responses to climate change, fostering mechanisms, and implementing measures to facilitate low-carbon climate development. In the context of the Chuka Last Mile Connectivity (LMC) for Sewerage project, the Act underscores the importance of reducing carbon emissions and advancing towards a low-carbon future., this means adopting construction practices and technologies that minimize carbon footprint.

The Act emphasizes resilience-building measures to counter the effects of climate change. Given the increased frequency of extreme weather events, such as floods and storms, it becomes crucial for the Chuka LMC project to design infrastructure that can withstand these challenges. This project has been designed with utmost consideration of extreme weather events that may compromise the infrastructure. The project assessments including this ESIA align with the Act's focus on adaptation and preparedness.

2.3. Institutional Framework

New project developments can have major impacts on the environment including soil degradation, altering landscapes and destroying natural habitats. Other problems associated with development and human activity include land use conflicts, human and animal conflicts, water management and environmental pollution. In addition to harming the environment, these impacts can and do have significant economic costs and negatively affect human health.

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

2.3.1. Ministry of Water, Irrigation and Sanitation

The mandate is formulation, review and implementation of policy on the water sector. The functions include: Water harvesting and storage infrastructure for water conservation, which will help in

- Mitigating droughts and famine;
- Catchment's area conservation;
- Water resources management policy;
- Urban and rural water development and supply;
- Waste water treatment and control;
- National water conservation and Pipeline Corporation;
- Flood preparedness and management to cope with and mitigate the impacts;
- Water quality and pollution control by adopting the 'Polluter Pays' principles in order to ensure water user responsibility.

2.3.2. Ministry of Environment, Forestry and Climate Change

This is the state office in charge of all issues affecting, and affected by, the environment and all its components.

The Ministry's core mandate includes the following;

- Environment and Natural Resources Policy formulation, analysis and review;
- Sustainable management of Mineral resources and conservation of environment;
- Continuous development of geo-database for integrated natural resources and environmental management systems;
- Conduct applied research and dissemination of research findings in land resources and environment
- Promote, monitor and coordinate environmental activities and enforce compliance of environmental regulations and guidelines;
- Meteorological services.

2.3.3. The National Environment Management Authority

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

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

2.4. International Policy Framework

Kenya is a signatory as well as a party to various international conventions, treaties and protocols relating to the environment and aimed at achieving sustainable development. According to the Registrar of International Treaties and other Agreements in Environment (UNEP 1999), there are 216 treaties, 29 of which are of interest to Kenya. The country is a signatory to 16 such agreements, which range from use of oil, protection of natural resources and protection of the atmosphere. The agreements are both regional and international and became legally binding on Kenya upon ratification thereof by the rightfully designated Kenyan Authority. The agreements of interest to Kenya can be categorized as those for protecting natural resources, atmosphere and social well-being.

2.4.1. United Nations Framework Convention on Climate change (UNFCCC)

The convention requires parties to take climate change considerations into account in their relevant social, economic and environmental policies and actions. The proponent has undertaken this ESIA with the aim of minimizing adverse effects of the project on the economy, on public health and on the quality of the environment. The requirements of this convention can be mitigated against to reduce impacts of climate change by growing trees suitable for the area.

The proponent is advised to enhance the positive impacts of the project through engaging in activities that control climate change for example planting of trees and conserving the catchment through water conservation.

2.4.2. The World Commission on Environmental and Development

The commission focused on the environmental aspects related to development and requires all development projects to be sustainable economically, socially and environmentally. The principle of the organization emphasis that development project should have no permanent negative impact on the biosphere and in particular the ecosystems.

It is recommended that the project proponent incorporate mitigation measures to ensure that the project impacts on the ecosystem are reduced. The consultants used participatory methods to involve the target group and concerned stakeholders in order to inform and enlighten them on the likely negative environmental and social impacts for them to prepare mitigation measures so as to ensure the proposed project is sustainable throughout its life span.

2.4.3. The United Nations Convention on Biological Diversity (CBD)

The international treaty was established in 1992 at the Earth Summit in Rio de Janeiro, Brazil. The convention recognizes that Earth's biological resources are vital to humanity's economic and social development. As a result, there is growing recognition that biological diversity is a global asset of tremendous value to present and future generations. At the same time, the threat to species and ecosystems has never been so great as it is today. Species extinction caused by human activities continues at an alarming rate. The CBD has three main objectives:

1. **Conservation of Biological Diversity**: The CBD aims to conserve biological diversity, which encompasses the variety of life on Earth, including ecosystems, species, and genetic diversity. This objective recognizes the intrinsic value of biodiversity and the need to preserve it for future generations.
2. **Sustainable Use of Biological Resources**: In addition to conservation, the CBD emphasizes the sustainable use of biological resources. This involves using natural resources in a way that meets present needs without compromising the ability of future generations to meet their own needs. Sustainable use ensures that ecosystems remain healthy and productive over the long term.
3. **Fair and Equitable Sharing of Benefits**: The CBD also addresses the fair and equitable sharing of benefits arising from the utilization of genetic resources. This includes sharing the benefits derived from the commercialization of genetic resources or associated traditional knowledge with the communities and countries that have conserved and sustainably used those resources.

The CBD provides that each contracting party, as far as possible and as appropriate, shall:

a. Introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participation in such procedures;
b. Introduce appropriate arrangements to ensure that the environmental consequences of its programmes and policies that are likely to have significant adverse impacts on biological diversity are duly taken into account;

The project will involve construction and operational activities that could impact local biodiversity, including vegetation, terrestrial habitats, wetlands and aquatic habitats if not well taken care for. The CBD encourages the conservation and sustainable use of biodiversity, which would require the implementation of the project activities consider appropriate mitigation measures as stipulated in the ESMP to minimize any negative impacts on biodiversity.

2.5. AfDB Operational Safeguards

The African Development Bank has an Environmental and Social Assessment and Management Policy (ESAMP) that guides its environmental and social risk management processes across its operations. The ESAMP outlines the principles, procedures, and requirements for assessing and managing environmental and social risks associated with AfDB-financed projects, Chuka Sewerage Last Mile Connectivity Project will result to numerous mild negative impacts to the environment which will be mitigated as the proposed project is categorized under category B under AFDB Categorizations criteria. In addition, the Bank has established the Environmental and Social Operational Safeguards (OSs), which serve as guidelines to amplify positive outcomes and mitigate adverse environmental and social impacts, including those stemming from climate change, in projects. The Bank is committed to supporting Borrowers in adhering to these OSs throughout the project lifecycle, in accordance with the principles outlined in this Environmental and Social Policy.

The African Development Bank's Environmental and Social Operational Safeguards requirements for the Bank's Borrowers have been discussed in the sub chapters below

Category A: A proposed project is classified as Category A if it is likely to have significant adverse impact on the environment. A project with complicated impact or unprecedented impact which are difficult to assess is also classified as Category A the impact of Category A projects may affect an area broader than the sites or facilities subject to physical construction.

Category B: A proposed project is classified as Category B if its potential adverse environmental impact is less adverse than that of Category A projects. Typically, this is site-specific, few if any are irreversible, and in most cases normal mitigation measures can be designed more readily.

Category C: A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impact. Projects that correspond to one of the following are, in principle, classified as Category C,

Chuka Sewerage Last Mile Connectivity Project is expected to impact the environment minimally and can be mitigated as they are site specific. The project does not traverse in any protected habitat with minimal vegetation clearance and minimal animal disturbances, international water way, indigenous persons regions.

2.5.1. OS 1: Assessment and Management of Environmental and Social Risk and Impact

The Environmental and Social Operational Safeguards aim to integrate environmental and social considerations, including climate change vulnerability, into Bank operations to foster sustainable development in the continent. Under OS1, Borrowers are responsible for assessing, managing, and monitoring environmental and social risks and impacts at each stage of Bank-supported operations. This includes stakeholder engagement and disclosing all documentation related to environmental and social assessment (ESA) prior to presenting operations to the Bank's Board of Directors.

The OSs is meant to aid the target economies in managing project risks and improving environmental and social performance through a risk- and outcomes-based approach. OS1 specifically focuses on identifying and assessing environmental and social risks and impacts, including gender inequalities and climate change vulnerabilities, and engaging stakeholders in the assessment process. It emphasizes adopting a mitigation hierarchy approach, which involves anticipating and avoiding risks and impacts, minimizing or reducing them to acceptable levels, mitigating them, and compensating for or offsetting significant residual impacts where feasible.

The proponent has ensured that the proposed project conforms to the project by conducting an Environmental and Social Impact Assessment. The ESIA Process adhered to the NEMA and the AfDB Operational Safeguards to the letter. All the stakeholders with interest in the project including the PAPs were involved in the entire process. This culminated to the development of an ESIA report with a Environmental and Social Management Plan to ensure that all the impacts of the projects are duly mitigated.

2.5.2. OS 2: Land Acquisition, Restrictions on Access to Land and Land Use, and Involuntary Resettlement

This safeguard emphasizes the avoidance and minimization of involuntary resettlement, where possible. The OS acknowledges the potential negative consequences of project-related land acquisition, land access restrictions, and property loss on communities and individuals. These impacts can include physical displacement (such as relocation or loss of shelter) and economic displacement (resulting in the loss of land, assets, or livelihood opportunities), or both. Involuntary resettlement encompasses these impacts and the processes to mitigate and compensate for them. Resettlement is deemed involuntary when affected persons or communities lack the genuine opportunity, free from coercion or intimidation, to refuse land acquisition or access restrictions leading to asset loss or displacement.

If left unaddressed, physical and economic displacement can lead to severe economic, social, and environmental risks. This includes the dismantling of production systems, potential impoverishment due to loss of productive resources or income sources, relocation to less conducive environments, weakening of community institutions and social networks, exacerbation of social inequalities, dispersion of kin groups, and erosion of cultural identity and traditional authority. Therefore, the safeguard emphasizes the avoidance of involuntary resettlement whenever possible. In unavoidable instances, efforts will be made to minimize it, and appropriate measures to mitigate adverse impacts on displaced persons (and host communities) will be carefully planned and implemented. Prior to implementing physical investments supported by the Bank

The Chuka LMC for the Sewerage Project has avoided involuntary resettlement by utilizing the road reserve. A Resettlement Action Plan (RAP) has been developed to address any potential impacts on Project Affected Persons (PAPs), ensuring adequate compensation if necessary.

2.5.3. OS 3: Habitat and Biodiversity Conservation, and Sustainable Management of Living Natural Resources

This safeguard aims to conserve biodiversity and promote sustainable natural resource management. It further reflects the objectives of the Convention on Biological Diversity to conserve biological diversity and promote the sustainable management and use of natural resources. It also aligns with the Ramsar Convention on Wetlands, the Convention on the Conservation of Migratory Species of Wild Animals, the Convention on International Trade in Endangered Species of Wild Flora and Fauna, the World Heritage Convention, the United Nations Convention to Combat Desertification, and the Millennium Ecosystem Assessment. Its recommendations also align with the International Plant Protection Convention, which covers the movement of invasive alien species and pests, as well as pest risk analysis for quarantine pests, including an analysis of the risks and impacts of genetically modified organisms. OS6 recognizes that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development.

The Environmental and Social Impact Assessment (ESIA) process included an assessment of the project's impact on biodiversity and ecosystems, with mitigation measures outlined in the ESMP to prevent severe impacts. The proposed development poses minimal threat to the flora and fauna present in and within the municipality. Less environmentally sensitive ecosystems exist within the project area, while the ecologically sensitive areas have been safeguarded by the provisions outlined in the Environmental and Social Management Plan. There is no flora or fauna listed in the IUCN Red List, which denotes species at risk, will be affected by the project.

2.5.4. OS.4: Resource Efficiency and Pollution Prevention and Management

This safeguard focuses on preventing pollution and efficiently managing resources. This Operational Safeguard (OS) recognizes that economic activities often cause air, water, and land pollution, and consume finite resources that may threaten people, ecosystem services, and the environment at the local, regional, and global levels. The current and projected atmospheric concentration of greenhouse gases (GHGs) threatens the welfare of current and future generations. In addition, more efficient and effective resource use, pollution prevention, and GHG emission avoidance, and mitigation technologies and practices have become more accessible and achievable. OS3 sets out the requirements to address resource efficiency and pollution prevention and management throughout the project life cycle in a manner consistent with Good International Industry Practice (GIIP)

As preliminary of the project a Waste Management Plan and an Effluent Discharge Control Plan has been developed to guide waste reduction, segregation, collection, and disposal practices, ensuring compliance with international best practices. Solid waste generated during the sewerage treatment process will be recycled through composting and sold as

manure to rural farmers. Effluent water from the treatment process will undergo testing before release into the environment or use for irrigation purposes.

2.5.5. OS5: Labour and Working Conditions

This safeguard addresses risks related to labour and working conditions. This safeguard establishes the AfDB's requirements for its borrowers or clients concerning workers' conditions, rights and protection from abuse or exploitation.

Various types of workers will be engaged in the project, including civil servants, workers from the Tana Water Works Development Authority (TWWDA), contractor workers, consultants, and community workers. Potential labour risks include environmental, health, and safety hazards, sexual harassment and exploitation, child labour, forced labour, disputes over employment terms and conditions, and discrimination against vulnerable groups. Measures to manage these risks include adherence to minimum wage regulations, limitations on working hours, provision of rest periods, annual leave entitlements, maternity and paternity leave, death benefits, and medical treatment for injured workers. The contractor will adhere to all the best practices to ensure the health and safety of employees is well taken care of.

Specific measures shall be undertaken by the contractor in conjunction with the proponent to protect vulnerable groups of workers, such as women, persons with disabilities, and youth (if any are employed in accordance with relevant regulations), ensuring they are not exploited and are provided with necessary support

3. CHAPTER THREE: PROJECT LOCATION AND DESCRIPTION

3.1. Project description

3.1.1. Existing Sewerage System

At present, Chuka Town sewerage system is under construction and near completion. The use of on-plot sanitation systems such as pit latrines and septic tanks for disposal of effluent is predominant A Decentralized Sewage Facility has been constructed in Chuka, capacity 22m^3 /day i.e. Septic tanks, Anaerobic Baffled Reactor and Constructed Wetland. The facility was commissioned in January 2017 and is currently underutilized due to lack of a sewage exhauster by NIWASCO, public awareness and public health enforcement. In situations of suppressed water supply, as in Chuka Town, the use of on-plot sanitation systems though unsustainable environmentally is manageable. Improvements to the water supply system have been designed and planned for Chuka Town to be implemented between year 2018 to 2020 with the development of additional water 4 resources and expansion of water distribution networks. The use of on-plot sanitation systems will not suffice and thus health and environmental hazards are bound to occur. There is, therefore, need for a development of a water-borne sanitation system which is environmentally sustainable.

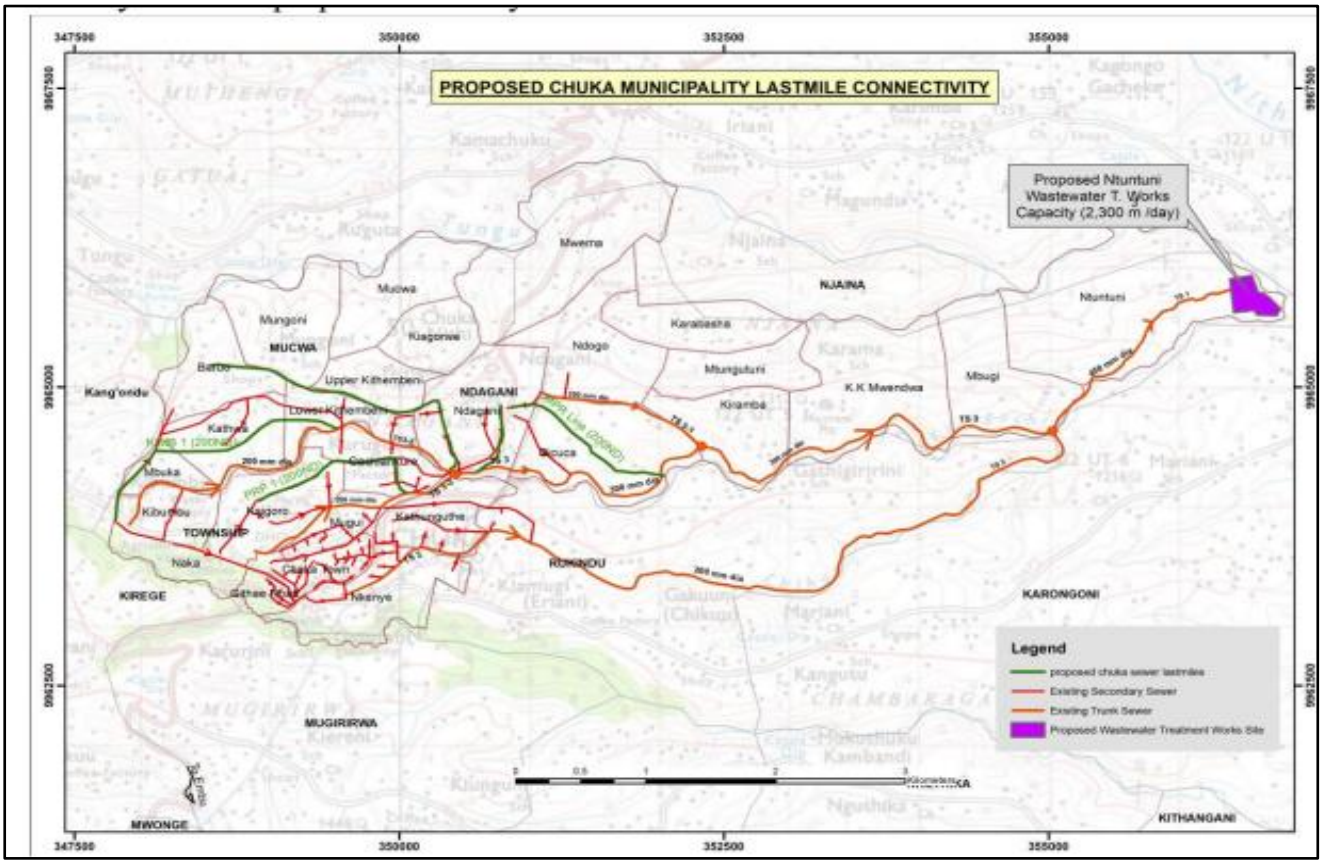

Figure 3-1: The proposed layout and the Existing sewer

3.1.2. Proposed Sewage Conveyance and Treatment Systems.

The scope of the proposed sewer conveyance system includes tertiary sewers, diameter 225mm, approximate length 9.5Km.

The Implementation of the project will result in:

- Realization of the 2030 for sustainable development goals of achieving universal and equitable access to safe and affordable drinking water for all, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation.
- Realization of the requirement of the Kenyan Constitution (2010) in article 42 and 43 that provide the right to clean and safe water in adequate quantities and to a clean and healthy environment.
- The realization of the Vision 2030 goal to achieve universal water supply and sanitation for all.
- Realisation of the Bottom-up Economic Transformation Agenda (BETA) under vision 2030 and National Water Sanitation Strategy, Ministry of Water, Sanitation and Irrigation Water Strategic Plan aim to improve service delivery in the water and Sanitation sector.

3.1.3. Proposed Last mile connectivity impacts

Implementation of the last mile connectivity will result in:

- An increased in sewage coverage of Chuka town from 80% to 95%.
- Improved sub-economic life of the people in the target area including environmental Conservation.
- Minimized loss of waste water as the treated waste water is released back to the nearby rivers for reuse downstream.
- Improved financial stability as the company will create more employment opportunities.
- An increase in revenue income for the Nithi Water and Sanitation company.

3.2. Design Criteria

This Design Criteria and Standards were prepared for adoption in the design of the various elements of the project. The design criteria cover, but is not limited to, the planning horizon, population projections, selection and sizing of sewers and treatment of wastewater.

3.2.1. References and sources of information Connection and Construction Approval

- BS EN 752:2008: Drain and Sewer Systems Outside Buildings.
- BS 8005-1:1987: Guide to new Sewage Construction.
- Various National Standards from:
- The Government of Kenya (Water Design Manual 2002)
- The Government of Tanzania (Maji Pipe Specifications-Issue 1:2007)
- Tables for Hydraulic Design of Pipes, Sewers and Channels, 6th Edition, HR
- Wallingford, 1994.
- Nairobi City Council Adoptive Standards 2.
- BS 5911: Precast concrete pipes and ancillary concrete products
- Domestic Waste Water Treatment in Tropical Countries by Prof Duncan Mara.

3.2.2. Design guiding principles

- The trunk sewers will be realigned as much as it will be practical to avoid interfering with existing private properties and developments;
- The trunk sewers will be realigned to follow the valleys as applicable;
- The design of sewers will aim at optimising the pipe gradients in order to minimise the earthworks.

3.2.3. Planning horizon and design periods

In sewerage systems, it is common practice to have a design horizon of up to 20 years. Based on this we propose the planning years to be as:

- Initial Design Year: 2024
- Future Design Year: 2035
- Ultimate Design Year: 2045

3.2.4. Population Projections

The 2019 Population Census Report provided the baseline for projecting the data. The population projections have been carried out for the Project Area. The population was established and the urban housing categorized as medium and low income are described below;

Low Income Group Housing (LIG)

This group, found mainly in pockets within larger urban areas, on urban outskirts or in peri-urban areas, is generally made up of high to very high-density developments. Such buildings provide rented accommodation, often single rooms, to single persons or low income married couples, and are normally provided with very basic piping, yard taps for dish and clothes washing, one or more common shower cubicles and one or more common WC facilities.

Medium Income Group Housing (MIG)

The medium income group housing are generally lower density developments than the LIG housing. Houses are normally furnished with at least internal piped water to a kitchen with cold water for dish washing, and bottled gas or electricity for cooking. The dwelling also has a shower, and where there is a mains sewerage system or a septic tank, with a water closet (WC). An outside tap is provided for clothes washing.

High Income Group Housing (HIG)

The housing in this category is generally composed of lower density developments than the MIG housing, although not always necessarily so. Houses are provided with internal piped multiple taps, cold and hot water systems, and electricity supply, bathrooms/showers, an internal arrangement for clothes and dish washing with WCs and mains sewerage or septic tanks facilities. Accommodation for one or more domestic / garden staff is often also on the property, this being provided with a cold-water tap, shower and WC

3.3. Water demand

3.3.1. Water demand estimation

The water demand estimation has been carried out using the following criteria:

- Population projection;
- Water consumer categories;
- Level of service;

The design team has also reviewed water demand categories for the following Components:

- Domestic (Residential) Demand,
- Commercial Demand.
- Institutional Demand.
- Industrial Demand.

3.3.2. Wastewater flows

I. Average dry weather flow (ADWF):

This is the total water consumption returning to the sewerage system taken as a Percentage (75-85%) of the average daily water demand. This excludes any provision for groundwater infiltration into the sewerage system.

II. Peak dry weather flow (PDWF):

The normal peak dry weather flow excludes groundwater infiltration. PDWF is calculated by multiplying the ADWF with a peak factor.

III. Peak wet weather flow (PWWF):

This is the PDWF allowing groundwater infiltration into the sewers during wet conditions. All sewers would be designed to run two thirds (67%) full at peak wet weather flow.

IV. Peak factors:

The Babbitt relationship between peak sewage flows and the population served will be used to estimate the peak factor. It states that;

M= 5/(P1/5)

Where, M is the peak factor

P is the population served in thousands.

3.4. Design Criteria and Standards for Sewage Conveyance System

3.4.1. Minimum size of sewers

In order to reduce the tendency of blockages, a minimum of 300 mm in trunk sewers was adopted.

Table 3-1: Minimum size of sewers

No of House Connections	Diameter
Individual connections	150 mm
Up to 5 house connections	150mm

Greater than 5 connections	200mm

3.4.2. Depth of sewers

The minimum depth of sewers at the starting points will be maintained at 900mm and 400mm at other locations. However, minimum and maximum depths of sewers are dictated by the actual ground conditions on site and economic considerations. The Table 3-2 shown below shows the protection criteria that generally apply in the design

Table 3-2: Depth of sewers and pipe protection criteria

	Depth range in mm	**Pipe protection**
In Open fields	400-600	Concrete bed and surround
	600-750	Concrete bed and haunch
	Over 750	Protection governed by factors other than shallowness 100mm concrete bed to be used when founding on rock
In roads	600-750	Concrete bed and surround
	750-1200	Concrete bed and haunch
	Over 1200	Protection indicated by factors other than shallowness. i.e Type C/Type D as provided in the drawings

The above-mentioned pipe protection criteria should however be checked with structural stability conditions of pipes using the Marston equation and proper measures recommended.

3.4.3. Pipe material

The following pipe materials are manufactured in Kenya:

- Precast concrete pipes
- uPVC pipes
- Steel pipes
- HDPE Double Wall Corrugated Pipes

According to the Design, HDPE DWC and concrete pipes are recommended for trunk sewers. We however propose the use of concrete pipes for trunk sewers due to their strength and durability. We propose HDPE DWC pipes for the laterals and reticulation sewers

3.5. Hydraulic design

3.5.1. Sewers flowing part-full

For circular conduits flowing part-full, the Colebrook-White equation has long been regarded as the one that most closely relates both pipeline theory and observed pipeline losses. The velocity has to be calculated using a re-arranged form of the Colebrook-White equation.

3.5.2. Friction factor in theory,

The roughness of pipes is related to the height of the roughness elements of the pipe wall. In practice it is also influenced by other factors, which includes the straightness of the pipe, number of connections, jointing etc. However, for sewers it is primarily dependent on the extent of slime growth on the pipe surface. BS 8005, 1987 gives the following recommendations shown below in Table 4 for new sewers which are free from deposits.

Table 3-3: Friction factors

Surface Water Sewers Material	**BS 8005 Recommended roughness factor,k**
Well pointed brickwork	1.5 mm
Spun concrete pipes	0.25 mm
Precast concrete pipes	0.30 mm
Clay with spigot and socket joints	0.06 mm
uPVC	0.03 mm
Foul water sewers	
Peak DWF between 0.76 m/s and 1.0 m/s (Where peak DWF = DWF diurnal maximum)	1.5 mm

It is recommended that friction factor for foul concrete sewers is 1.5 mm. This factor will be proposed in the design

3.5.3. Minimum velocities and pipeline gradients

The minimum gradients for foul sewers shall be such as to produce velocities sufficiently high to ensure that the pipes are self-cleansing. BS 8005 states that all sewers shall be laid at sufficient gradient which will give a minimum velocity of 0.75 m/s occurring sufficiently frequently, and that this is usually achieved by laying sewers at gradients that will give a velocity of 1.0 m/s at full bore flow. The NCC Parameters for Adoptive Standards recommends that velocities should exceed 0.75 m/s in pipes when flowing full at peak flow conditions. A velocity of 1.0 m/s, however is often considered necessary in tropical climates to avoid the build-up of hydrogen sulphide in sewers, which causes odour and corrosion problems. This requirement is more important for trunk sewers, and is not appropriate for house connections and secondary sewers where flows may be intermittent and retention times short. For larger sized sewers, it is recommended that full bore velocity of 1.0m/s as shown below be maintained in order to avoid septicity

The recommended gradients for various pipe sizes are shown in the following Table 5 below with a minimum gradient calculated for Ks=1.5mm

Table 3-4: Pipe gradients

Diameter (mm)	**Minimum Gradients for Full-bore V=**			**Recommended Gradient (For smaller diameters)**	**Recommended Gradient (For larger diameters)**
	1.0m/s	0.87m/s	0.75m/s		

	1 in:	1 in:	1 in:	1 in:	
150	77	100	135	100	
225	130	175	235	175	
250	150	200	270	200	
300	190	250	340	250	
350	235	300	415	300	
400	280	370	495	370	
450	325	425	575	400	
500	370	490	660	450	
600	470	620	830		470
750	620	820	1100		620
900	860	1140	1500		860

It is useful to note that the gradients are largely dictated by practical ground conditions

3.5.4. Maximum Velocities

A maximum velocity of 4m/s is recommended to avoid abrasion of the sewer pipes.

3.5.5. Manholes

Manholes shall be constructed at every change of alignment, of gradient, at the head of sewers or branches, at every junction of two or more sewers and wherever there is a change in the size of sewers. NCC recommendations for minimum manhole spacing and wayleaves are given in the Table 6 below

Table 3-5: Recommended manhole spacing

Sewer Size		Manhole Spacing	Min. Manhole Dia.	Construction Wayleave	Permanent Wayleave
From	To				
mm	mm	m	mm	m	M
230	375	60	1050	4	3
450	610	80	1200	5	4.5
635	900	100	1500	6	6.0

Manholes shall be constructed of locally manufactured bricks where the sewers are shallow (up to 600mm depth) but preference will be given to cast in situ or precast concrete manholes. Precast concrete manholes/slab covers shall be adopted in order to discourage theft or vandalism. In areas with heavy traffic, heavy-duty cast-iron manhole covers could be used, while medium duty manhole covers and frames or equivalent could be used in areas with limited traffic access. Manhole covers are to be imbedded in road bitumen after final inspection if required. The minimum height from the soffit of the pipe to bottom of the roof slab shall be maintained at 2m in order to provide comfortable space for the maintenance purposes.

3.5.6. Benching

An area of benching should be so provided in each manhole as to permit a man to stand easily, comfortably and without danger to himself, on such benching while working in the manhole. Manhole benching is designed at a grade not steeper than 1 in 5 or flatter than 1 in 25 and will be battered back equally from each-side of the manhole channels

3.5.7. Structural design of sewers and pipes

The maximum and minimum trench depths for sewers of various materials is calculated using the methods given in National Annex (NA) to BS EN 1295-1:1998. Appropriate materials for the intended depth of installation are considered. The computation of loads on buried pipelines has been established by the work of Marston, Spangler and others, and is summarized by the Simplified Tables of External Loads on Buried Pipelines, which will be considered for this Project. The trench bottom shall be smooth and free from all stones and other projections, in order to give the pipe an even support for the entire length. Where this is not possible, and in rock, a minimum depth of 100mm of granular material shall be provided as bedding under pipes, shall be placed between the pipes and the trench sides and brought up in 200 mm compacted layers to at least 150mm above the crown of the pipe. Where the depth of cover to pipes is low, concrete bedding, haunch and surround shall be provided

3.6. Proposed Project Activities

3.6.1. Planning Phase

The planning phase of the Last Mile Connectivity for the Chuka Sewerage Project involves crucial activities undertaken to lay the groundwork for the successful implementation of the project. The activities include

Designing: This involves developing detailed engineering designs and plans for the sewerage system, including pipelines, and other necessary infrastructure. The activity also encompasses assessing factors including: terrain, soil conditions, hydraulic capacity, and environmental impact to ensure the feasibility and effectiveness of the proposed system.

Engineers, surveyors, Environmental experts and other consultants have been engaged to oversee the design process and ensure compliance with relevant standards and regulations. The out come of the process has been the design reports, Environmental and Social Impact Assessment report accompanied with prerequisites management plans

Acquisition of Permits and Authorization: this will involve obtaining the necessary permits and authorizations from regulatory bodies and local authorities is crucial before commencing any construction activities. This process will involve submitting project plans, environmental impact assessments, and other required documentation to obtain approvals for the sewerage project. Other authorizations will include permits to use the road reserves from the road agencies including KeNHA, KeRRA, KURA and County government of Tharaka Nithi

Land Acquisition through RAP: The Chuka Last mile connectivity for the sewerage project will require land acquisition as some of the surveyed lines will pass through private lands. A Resettlement Action Plan will be developed to ensure fair and adequate compensation for affected landowners and communities.

Seeking Source of Funds: Identifying and securing funding sources is essential to finance the construction and operation of the sewerage system. This will involve exploring various financing options, including government grants, loans, public-private partnerships, or international aid agencies including the AfDB.

Compensation of the Project-Affected Persons: The project affected persons will then be compensated for the livelihood lost to the acquisition of the way leave by TWWDA. Ensuring fair and equitable compensation for individuals affected by the sewerage project will be essential to avoid the back-and-forth compensation conflicts and issues.

Preparation of Tender Documents: the proponent will then develop comprehensive tender documents that outline the project scope, specifications, terms and conditions, and evaluation criteria is crucial to solicit competitive bids from potential contractors.

Site Handover to the Contractor: Once the tender process is completed and a contractor is selected, the project site will be formally handed over to the contractor for construction activities to commence. This will involve conducting site inspections, reviewing safety protocols, Environmental and Social Management Plan and ensuring that the contractor has all necessary resources and permissions to begin work on the LMC for the sewerage project.

3.6.2. Construction Phase

During the construction phase, the contractor will establish a campsite to accommodate workers and office stations to facilitate project operations. The campsite will include temporary housing units depending on the number of workers who will be hosted. In addition to the campsite, the contractor will establish office stations to serve as administrative and logistical hubs for project management and coordination. Adequate amenities for health, safety, and hygiene, including first aid stations and sanitation facilities, will be available to meet regulatory requirements and promote worker welfare.

The construction activities for the last mile connectivity will include:

Excavation and Trenching: Excavation and trenching will be conducted to lay down the pipelines and infrastructure necessary for the sewerage system. This will involve digging trenches along the designated routes according to the engineering designs and specifications. The process will involve the use of excavators, backhoes with a blend of human labour

Pipeline Installation: Once trenches are prepared, the sewer pipelines will be installed along the designated routes. Ut most attention will be paid to ensure proper alignment, depth, and grading of the pipelines to facilitate efficient flow and prevent blockages or leaks.

Construction of Manholes and Inspection Chambers: Manholes and inspection chambers will be constructed at regular intervals as described in the design along the sewer lines. The structures provide access points for maintenance and inspection purposes and facilitate changes in pipeline direction or elevation.

Backfilling and Compaction: Once pipelines and structures are installed, trenches will be backfilled with suitable materials and compacted to restore the surface to its original condition.

Testing and Commissioning: This will be a critical moment of the construction phase where the proposed LMC for the sewer project shall be tested to give an assurance that the system is functional without defects before the ownership is transferred to the Water Service Provider

Throughout the construction phase, rigorous quality control and assurance measures will be implemented to verify compliance with design specifications, construction standards, and regulatory requirements. This will include conducting inspections, testing materials and components, and monitoring construction activities to identify and address any deviations or deficiencies promptly.

Strict health and safety protocols will be enforced to protect workers, the public, and the environment during construction activities. In addition, effective communication with local communities and stakeholders will be maintained throughout the phase to address concerns, provide updates, and minimize disruptions. Community engagement initiatives will include public meetings, information sessions, and grievance mechanisms to ensure transparency and accountability.

Demobilisation of the Site

Once everything has been handed over to the proponent, the contractor will demobilise the campsite and leave it as neat as possible. The contractor will be responsible for ensuring the complete rehabilitation of the campsite once its purpose has been fulfilled. This will include the removal of all structures, foundations, and hard surfaces. Additionally, the septic tanks used must be emptied by licensed waste disposal handler and properly backfilled. All waste materials must be disposed of in accordance with the guidelines outlined in the Environmental and Social Impact Assessment

3.6.3. Operation Phase

Upon completion of the construction phase for the LMC, the sewerage system in Chuka will be fully operational, providing reliable sanitation infrastructure to the community. The management and operation of the newly constructed sewerage treatment and system will be overseen by the NIWASCO, following the guidelines outlined in the Water Act 2016 and the regulations set by WASREB.

Continuous monitoring of the sewer system's performance will be conducted to ensure its compliance with local, national, and international environmental sustainability standards and best practices. Regular assessments and scientific tests will be carried out to verify that the infrastructure continues to meet the required standards and effectively serves its intended purpose. Additionally, these periodic evaluations will ensure that the sewer system remains aligned with the latest developments and advancements in sanitation infrastructure technology.

3.6.4. Decommissioning

During the decommissioning phase, which may be necessitated by changes in project objectives, climatic conditions, or government policies related to land and water use, affected structures will be demolished. Non-reusable materials from the dismantling process will be sold to authorized scrap metal dealers. Project activities will cease during the phase, and structures be demolished. Land affected by the project will undergo landscaping efforts, including the planting of appropriate indigenous trees and grass, to restore its natural condition.

3.6.5. Project Duration

The sewer project is expected to have a construction duration of about 18 months from the issuance of an Engineering, Procurement, and Construction (EPC) contract. Following the decision to proceed with the project and the subsequent awarding of the EPC contract, there will be approximately a 3-month period before construction mobilization begins. The projected average rate of pipeline installation is estimated to be approximately 500 meters per day, although progress may be slower in challenging areas such as road crossings. Additionally, the construction schedule will factor in weather conditions, especially during the peak rainy season, to mitigate any potential delays.

3.6.6. Machinery

The machinery required for the construction of the Chuka LMC sewerage project will include but not limited to:

- Excavators essential for digging trenches meant for laying pipelines and various earthmoving tasks.
- Backhoe loaders to be used for digging, lifting, and loading materials, making them useful for various construction activities.
- Dump trucks will be necessary for transporting materials including soil, gravel, and construction debris to and from the construction site.
- Compactors shall be utilized to compress soil, gravel, or asphalt to create a stable foundation for the pipeline and other structures.
- Trenchers shall be used to dig narrow trenches quickly and efficiently, particularly for laying underground pipelines.
- Graders are to be used for levelling and smoothing the ground surface to ensure proper drainage and road construction whenever needed.
- Concrete mixers will be essential for preparing concrete onsite, which is used for constructing manholes, culverts, and other infrastructural components of the LMC project
- Welding machines will be required for joining sections of pipelines and for other metal fabrication tasks.

3.6.7. The construction Work force

The construction workforce for the Chuka LMC of the sewer project will consist of various skilled and unskilled personnel involved in different aspects of the construction process. The project is estimated to employ up to 150 workers, comprising both skilled and unskilled labour. The unskilled labour force will primarily be recruited from the

immediate community surrounding the project site, providing employment opportunities for local residents and contributing to community development. On the other hand, skilled labour will be selected based on merit, ensuring that qualified individuals with the necessary expertise and experience are recruited to fulfil specific roles within the project. Some of the key roles within the construction workforce will include:

- Engineers will be responsible for overseeing the design, planning, and execution of the sewerage project.
- Project managers will responsible for overall project coordination, scheduling, budgeting, and ensuring that construction activities are carried out efficiently and according to specifications.
- Site Supervisors: will oversee construction activities on-site, ensuring that work is performed safely, according to plans and specifications, and within budget and schedule constraints.
- Construction Workers: Skilled and unskilled laborers will be involved in various construction tasks including excavation, trenching, pipe laying, concrete work, welding, and general labour.
- Heavy Equipment Operators: Operators of excavators, bulldozers, backhoe loaders, dump trucks, and other heavy machinery are essential for earthmoving, trenching, and material transport activities.
- Welders: will be responsible for joining sections of pipelines, fabricating metal structures, and performing other welding tasks as needed.
- Surveyors: will be engaged in land surveying and layout tasks to ensure accurate placement of pipelines and other infrastructure components.
- Environmental Health and Safety Officers: the officers will be responsible for implementing and enforcing safety regulations, conducting safety training, and ensuring a safe working environment for all construction personnel.
- Support Staff and other support personnel will play crucial roles in supporting construction operations.

4. CHAPTER FOUR: ENVIRONMENTAL BASELINE CONDITION

4.1. Bio-Physical Conditions

4.1.1. Location of the Project

The Chuka Project Area is located approximately 180km north of Nairobi, the Capital City of Kenya, in Tharaka Nithi County. Chuka Town is on the western slopes of Mt. Kenya. The Project Area covers 380 km^2 in Meru South sub-County and borders Mt. Kenya Forest to the West, Tharaka sub-County to the East, Maara sub-County to the North and Embu County on the Southern border. Chuka Town is the biggest Town in the County and its environs are largely rural in nature.

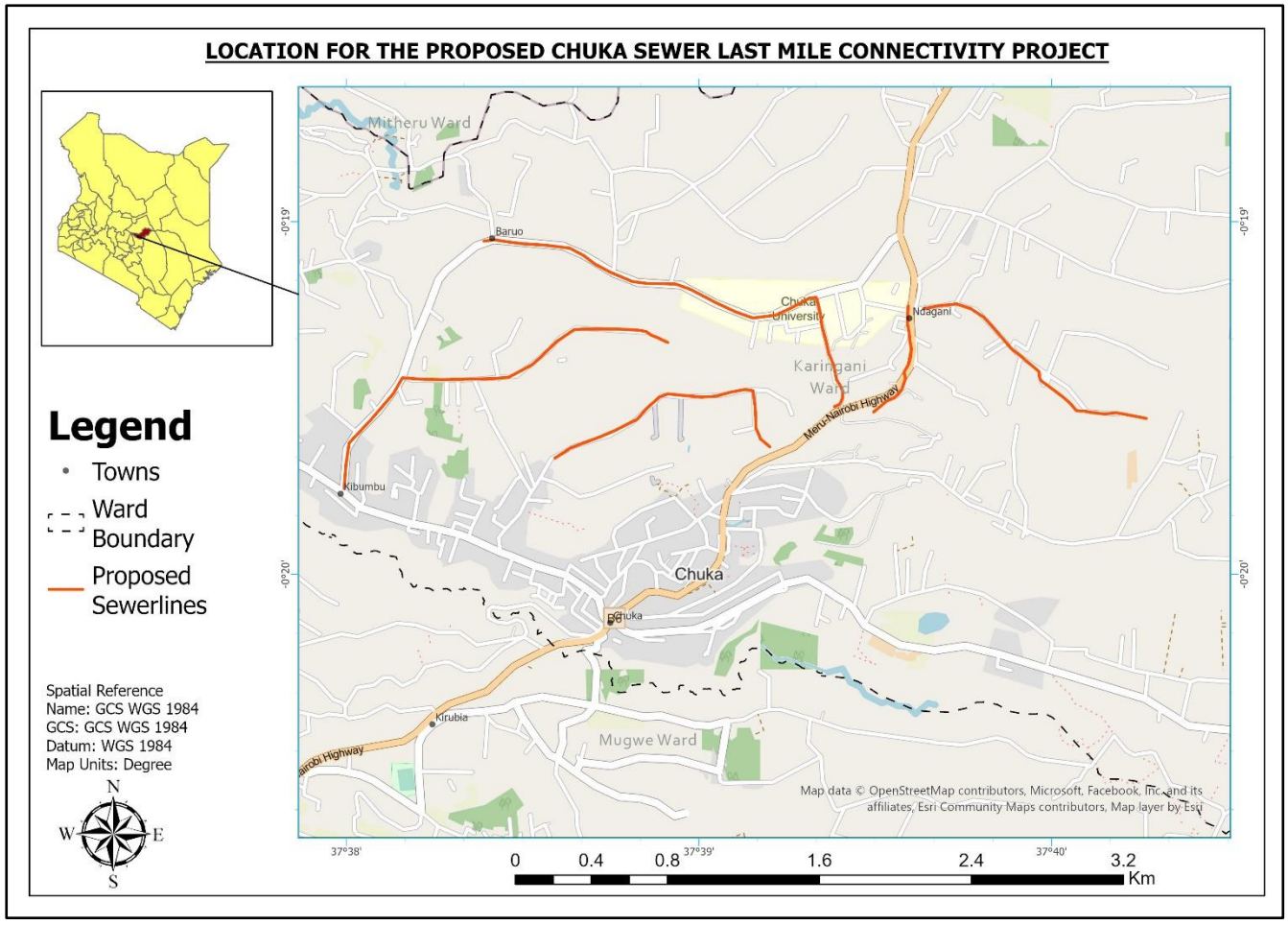

Figure 4-1: Location for the proposed Chuka Sewer LMC

4.1.2. Topography

The topography of Chuka is greatly influenced by Mt. Kenya volcanic activity creating 'V' shaped valleys on the landscape. There are numerous rivers originating from Mt. Kenya including Thuci, Mara, Mutonga, Naka and Ruguti. The drainage pattern consists of rivers and streams that ultimately drain into the Indian Ocean through Tana River. The highest area in the project area falls on the Western sides of the town forming the slopes of Mt Kenya while the lowest side falls in the East within the River Ruguti riverbed. The relief of the area slopes generally to the east characterised by V shaped ridges and multiple

spurs. Its important to note that the sewer systems have been designed with keen adherence to the slope to allow sewer conveyance through gravitational flow.

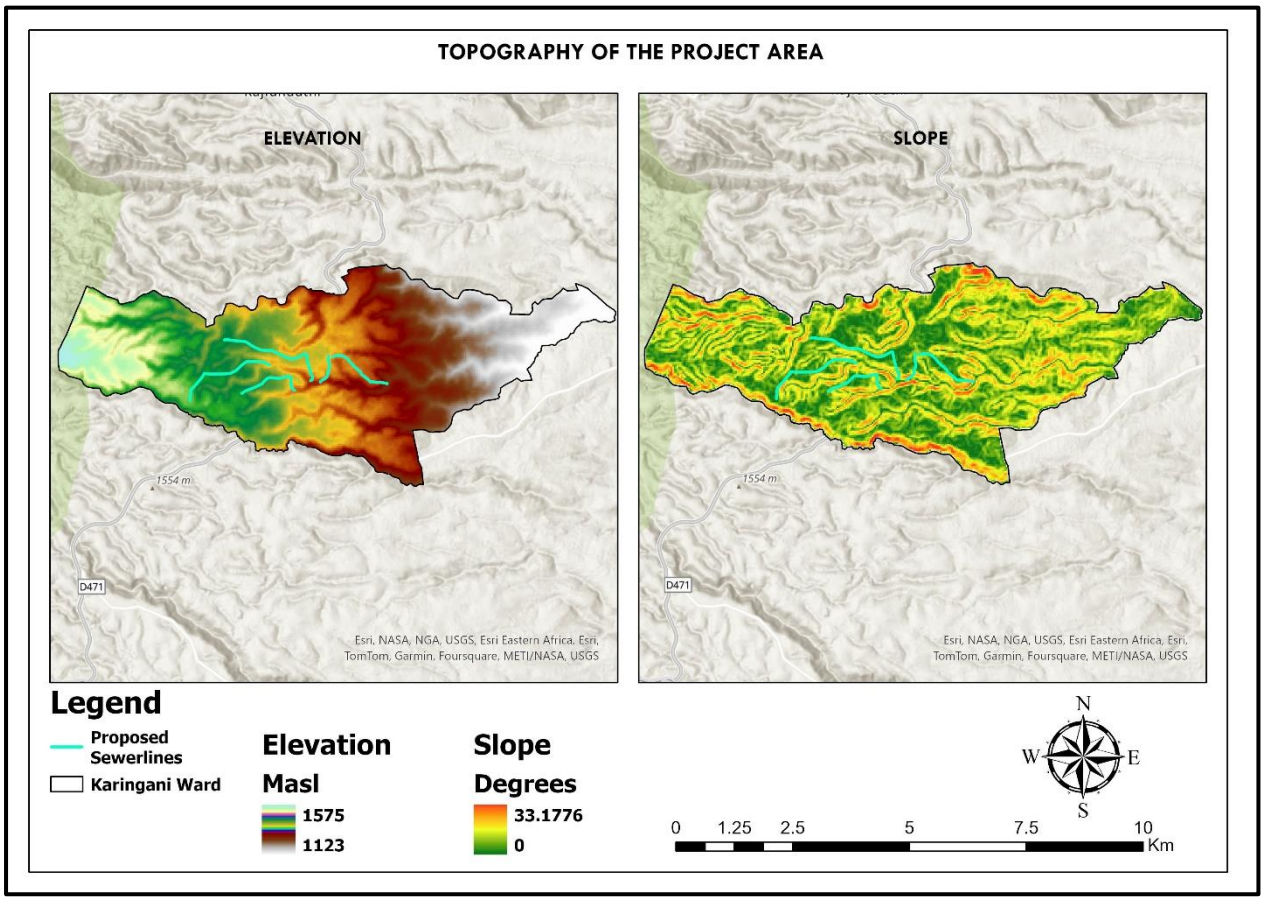

Figure 4-2: Topography of the project area

4.1.3. Geology and Soils

The highlands adjacent to Mt. Kenya are characterized by well drained, extremely deep dusky red to dark reddish brown, friable clay with acid humus top soils. In the lowlands away from Mt. Kenya, the soils area mixture of well drained, shallow to very deep dusky red to dark brown, friable, rocky, boulders, stony loam to clays. The soil composition in Chuka Town varies depending on the specific location within the region. Generally, the soils are fertile, suitable for agriculture, and consist of a mix of volcanic soils, red soils, and loamy soils. These soil types support diverse agricultural activities

4.1.4. Climate

The Project Area has a bi-modal rainfall pattern with the long rains falling during the months of April to June and the short rains in October to December. The rainfall ranges from 2,200mm near Mt. Kenya Forest to 500mm in the semi-arid parts. The high-altitude areas experience reliable rainfall while middle areas of the county receive moderate rainfall. The lower regions receive low, unreliable and poorly distributed rainfall. The climate is favourable for cultivation of tea, coffee, maize, cowpeas, pigeon peas, tobacco and a variety of other food crops. Temperatures in the highland areas bordering Mt. Kenya Forest range between 14^0 C to 30^0 C while those of the lowland area range between 22^0 C to 36^0 C.

4.1.5. Hydrology and Water Resources

The hydrology of Chuka is highly influenced by the physiographic characteristics of the locality. The town is at slopes of Mt Kenya which is one the major water towers in Kenya. The town falls within the Rugiti Sub Catchment area (4EB) which forms part of the Tana River catchment area. Chuka area id characterised by numerous permanent springs and transient streams which forms part of the major rivers within the Tana Basin area. some of the main rivers within the locality include: Maara, Ruguti,Kuruguchi, Kamuu, Tungu, Muthirani, Nako, Nithi and Thaaria. The water sources within the locality have been abstracted by the community for agricultural and domestic purposes.

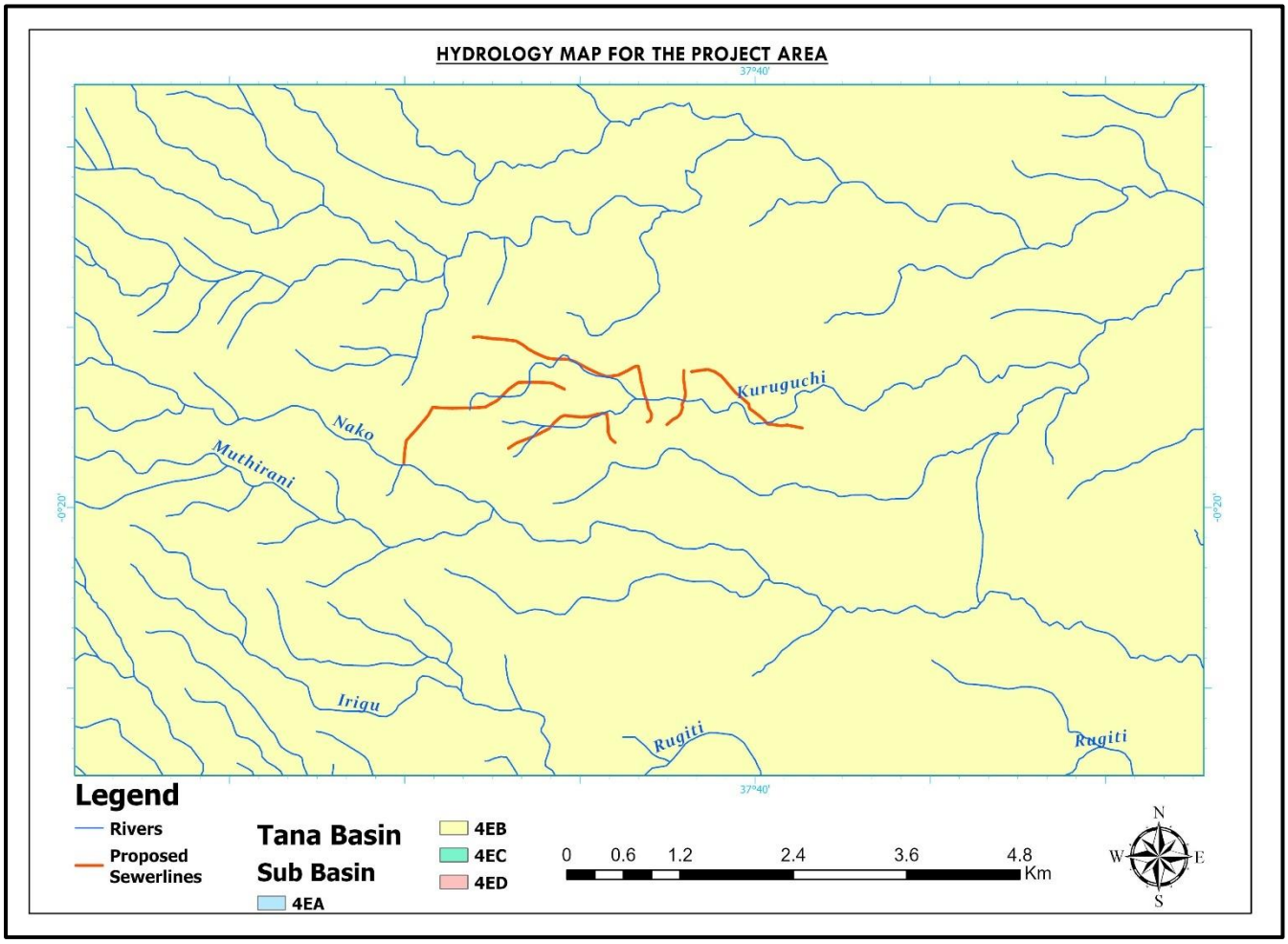

Figure 4-3: Hydrology map for the immediate project area

4.1.6. Flora

Biodiversity of the Project area is highly influenced by the Mt Kenya Forest Ecosystem with respect to indigenous plant cover species. The vegetation in Chuka Town ranges from montane forests at higher elevations to savannah grasslands and agricultural areas at lower altitudes. The slopes of Mount Kenya are often covered with lush forests, while the lower-lying areas are predominantly used for farming, with crops such as maize, beans, tea, coffee, and vegetables being common. The most common tree species in the forested areas are indigenous and include *Prunus Africana, Cordia abyssinnica, Croton*

megalocarpus, Makhamia lutea, Techlea nobilis, Trichilia emetica, Kigelia Africana and Bersama abyssinica.
Other species found within Chuka include *Cordia africana (Muringa), Vepris nobilis (Muteratu), Solanecio mannii (Mutomboro), Eucalyptus grandis (Mbaau), Croton macrostachyus (Mutuntu), Dombeya torrida (Mukeu), Olea europaea (Muthata), Combretum molle (Murama), Clausena anisate (Mukithia), Grevillea robusta (Mukima), Celtis gomphophylla (Mtoro), Millettia dura (Muangua) and Cupressus lusitanica*,

4.1.7. Fauna

The region around Chuka Town is known for its rich biodiversity being influenced by the proximity to the Mt Kenya Forest Ecosystem. The locality to the Mt Kenya area is home to diverse wildlife including dikdiks, gazelles, baboons, vervet monkeys, colobus monkeys, African giant rats, wild pigs, warthogs, hyena, mongoose, porcupine, snakes like green mamba, black mamba, python, puff udder, sand snakes, various species of butterflies and birds, including various plant and animal species. The forests harbour a variety of wildlife, including monkeys, antelopes, and a wide range of bird species. However, human activities such as deforestation and agricultural expansion pose threats to this biodiversity

4.1.8. Land Use

Chuka area exhibits a diverse array of land use patterns, reflecting its dynamic natural and human landscapes. The municipality encompasses various land cover types, each serving distinct ecological, economic, and social functions.

The landscape is characterized by expansive open grasslands covering an area of 898.065 hectares, providing crucial grazing grounds for livestock and supporting biodiversity. The area features significant areas of dense and moderate forests spanning 220.518 and 81.617 hectares, respectively. These forested areas play a pivotal role in maintaining ecosystem health, regulating local climate patterns, and safeguarding watershed integrity. They also offer opportunities for sustainable forestry practices and ecotourism ventures.

Human settlement and urbanization are evident in the built-up areas, covering 648.144 hectares. These urban zones accommodate residential, commercial, and minimal industrial activities, serving as hubs of economic growth and cultural exchange. However, urban expansion poses challenges such as habitat fragmentation and increased demand for natural resources.

Agricultural land use is prominent in Chuka, with areas dedicated to both annual and perennial croplands. The locality has 645.582 hectares of annual cropland, supporting diverse agricultural practices including crop cultivation and horticulture. Perennial croplands, spanning 28.436 hectares, contribute to the region's agricultural diversity and food security.

Wooded grasslands, covering 32.27 hectares, represent transitional zones between forests and open grasslands, supporting a mix of woody vegetation and herbaceous plants. These areas provide valuable forage resources for livestock and contribute to landscape heterogeneity.

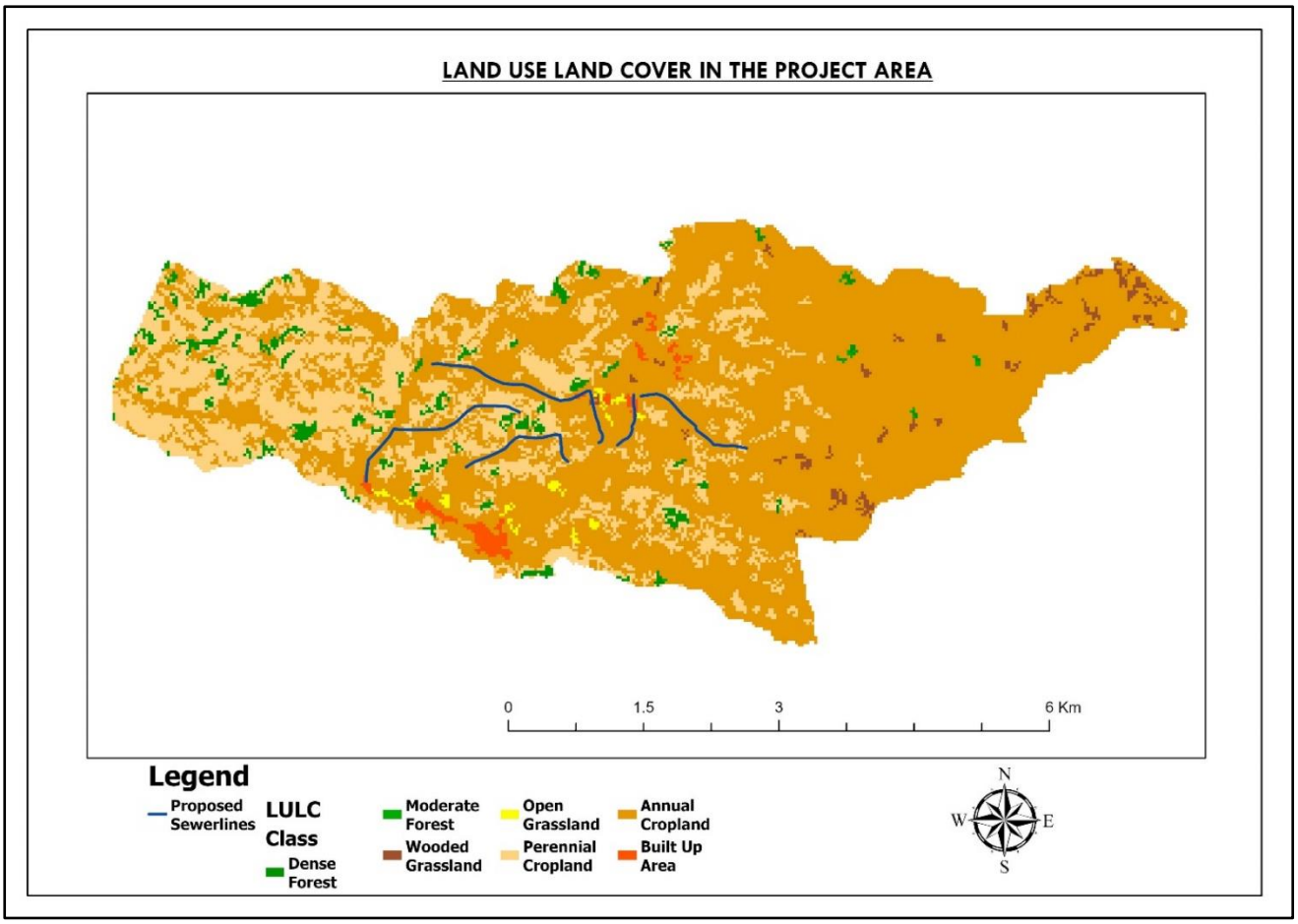

Figure 4-4: Land Use Land Cover Map for the project area

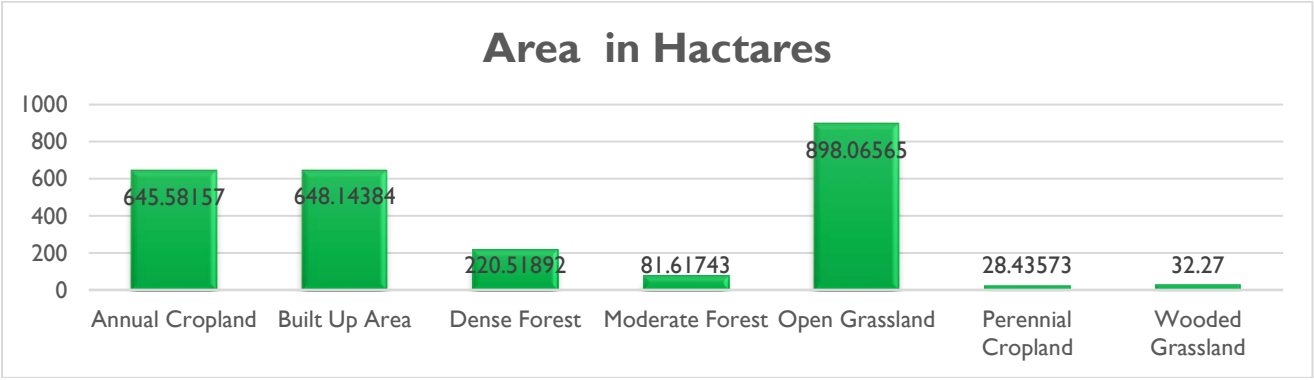

Figure 4-5: Land use Land Cover Statistics

4.2. Social-economic Conditions

4.2.1. Population and Demographics

Chuka Town has a diverse population comprising various ethnic groups, including the Meru, Embu, Kikuyu, and others. Understanding the demographics helps in planning social services and infrastructure. According to the 2019 Kenya Population and Housing census the total population of Tharaka Nithi County is 393,177. The male population stands at 193,764 while the female population stands at 199,406. The Project will be located in Chuka sub-location where the total population was estimated at 53,408 with 26,300 males and 27,106 females with dwelling in 17,104 households. translating to a population density of 721 persons per kilometre square

The 2019 Population Census Report provided the baseline for projecting the data. The population projections have been carried out for the Project Area. The population was established and the urban housing categorized as medium and low income are described below:

I. Low Income Group Housing (LIG)

This group, found mainly in pockets within on urban outskirts or in peri-urban areas, is generally made up of high to very high-density developments. The buildings provide rented accommodation, often single rooms, to single persons or low income married couples, and are provided with very basic piping, yard taps for dish and clothes washing, one or more common shower cubicles and one or more common WC facilities.

II. Medium Income Group Housing (MIG)

The medium income group housing are lower density developments than the LIG housing. Houses are furnished with at least internal piped water to a kitchen with cold water for dish washing, and bottled gas or electricity for cooking. The dwelling also has a shower, and where there is a mains sewerage system or a septic tank, with a water closet (WC). An outside tap is provided for clothes washing.

III. High Income Group Housing (HIG)

The housing in this category is generally composed of lower density developments than the MIG housing, although not always necessarily so. Houses are provided with internal piped multiple taps, cold and hot water systems, and electricity supply, bathrooms/showers, an internal arrangement for clothes and dish washing with WCs and mains sewerage or septic tanks facilities. Accommodation for one or more domestic / garden staff is often also on the property, this being provided with a cold-water tap, shower and WC

4.2.2. Agriculture:

Agriculture is a significant economic activity in Chuka Town and its surroundings. Crops such as tea, coffee, maize, beans, and vegetables are commonly grown. Enhancing agricultural productivity and value chains supports livelihoods and boosts the local economy. Livestock keeping is significant with dairy cows, sheep, goats, poultry and house pets (dogs and cats) may also constitute part of the wider biodiversity

Figure 4-6: Agricultural lands within the proposed way leave

4.2.3. Trade and Commerce:

Chuka Town serves as a commercial centre for the surrounding rural areas, with markets, shops, and small businesses catering to the needs of residents. Promoting entrepreneurship and improving market infrastructure can stimulate economic growth.

Figure 4-7: Business premises within Chuka town

4.2.4. Water Supply and Sanitation

Water Supply and Sanitation Services in Chuka Town are managed by Nithi Water and Sanitation Company, NIWASCO. In addition to the NIWASCO system, there are several community water supply schemes which supply raw water for domestic consumption and irrigation. Community Water Supply Schemes have pipe networks that run parallel to the WSP networks in the urban areas and extend to rural areas beyond the NIWASCO network.

Table 4-1: Details of Existing Water Supply Systems (Source: Chuka Sanitation Project Design Review Report, 2016-2017)

Description	Chuka Area of Supply
General Details	

Area of Supply (Total area of supply as per NIWASCO's Service Provision Agreement)	Current supply area - 115Km^2 Total supply area - 380Km^2 i.e., 30% coverage in Chuka Town and its environs.
Community Water Supply Schemes	More than 20 Nr. Community Water Schemes Local Community Projects construct run-of-the-river intakes on rivers from Mt. Kenya Forest. The water is supplied to domestic and institutional customers for domestic consumption and irrigation.
Existing NIWASCO Water Supply Network	
Intake Works	Reinforced Concrete run-of-the-river Intake on Tungu River
Twin Raw Water Mains	275mm dia uPVC, pipe length 3 km 250mm dia uPVC, pipe length 3 km
Water Abstracted	10,800m^3/day reported by NIWASCO
Water Treatment	Kiang'ondu Water Treatment Works operates two separate treatment systems; Sedimentation + Chlorination - 3,500m^3/day Chlorination only - 6,500m^3/day
Water Supply Volumes	Average 10,000 m^3/day reported by NIWASCO as recorded by Bulk Meters at the Treatment Works
Non-Revenue Water, NRW	74% - Estimated by NIWASCO
Water Supply Pipe Network	Approximate total length of transmission mains 60Km Diameters ranging from 50mm to 250mm uPVC
Water Storage	15 Nr. Storage Tanks, sizes ranging from 50m^3 - 1,000m^3

4.2.5. Education

The locality's educational landscape comprises a range of institutions catering to various levels of learning, from early childhood to tertiary education. At the foundational level, Early Childhood Development Education (ECDE) centers provide essential early learning opportunities for children, typically starting at the age of four. These are typically church based and community based being developed by the Tharaka Nithi county government.

The project area has Primary Schools which serve as the next step in the educational journey, accommodating approximately 43,000 pupils according to estimates from the Kenya National Bureau of Statistics. These schools are publicly owned managed by the county education board and privately owned by individuals and the church organisations. Primary schools within include: Ndagani Primary, Milimani Academy, Kathithuni Boarding, Chuka Catholic Primary, and Mungoni Primary School, Secondary schools within the project area are mainly public. Notable Secondary Schools in Chuka include Chuka Boys High, Chuka Girls High School, and Ndagani Secondary School, Mungoni Youth Polytechnic is one of the notable TVET institution within the project area.

Chuka University is a major institution located in Ndagani sub-location. The current student and staff population is approximately 4,000 and is projected to grow to 15,000 within the Project Design Horizon year 2037. Currently the students and lecturers live in privately developed housing units in the nearby Ndagani sub-location. This has led to a rapid upsurge of population in Ndagani and its environs which are now fast becoming urban and peri-urban areas. The University plans to accommodate a maximum of 5,000 students in hostels on campus. Construction of a 2,000-student capacity hostel is currently in progress.

Water demand was calculated for the University Day population within campus and the ultimate hostel population. The non-resident students and staff are housed in Ndagani and Mucwa sublocations and are responsible for the high population growth rates in the area and therefore, water demand for the non-resident students and staff is catered for in the residential category.

4.2.6. Health Facilities

A variety of health facilities cater to the healthcare needs of the community, comprising both public and privately-owned establishments within Chuka. These facilities range from clinics and dispensaries to hospitals, providing essential medical services to residents.

Clinics and dispensaries serve as primary healthcare centres, offering preventive, diagnostic, and treatment services for common ailments and minor injuries. These facilities are often the first point of contact for individuals seeking medical assistance and play a crucial role in promoting community health and well-being. Most of the them are privately owned by individuals or faith-based organizations including churches. Some of the dispensaries within the project area include: Kiereni Dispensary, Kirege Community dispensary, Kiamuchi Dispensary, Rukindu Dispensary. The clinics include: St Lucy Hospital, Komarock Modern Health Care Clinic, Daily care medical hospital.

Hospitals in Chuka, whether public or private, provide more comprehensive medical care, including emergency services, surgical procedures, and specialized treatments for complex health conditions. Some of the hospitals within Chuka include: Chuka County Referral Hospital which is the main government health facility serving the entire county. Other hospitals within the project area include: Consolata hospital Chuka, St Lucy Hospital, Chuka Nursing home Chuka University Hospital and Chuka Cottage Hospital.

4.2.7. Sensitive Receptors

Sensitive receptors for the proposed Last Mile Connectivity for Chuka sewerage project were identified as populations that could be adversely impacted by the project's construction and operation activities. These receptors were mapped based on their proximity to the proposed sewer line routes. The following table categorizes these receptors:

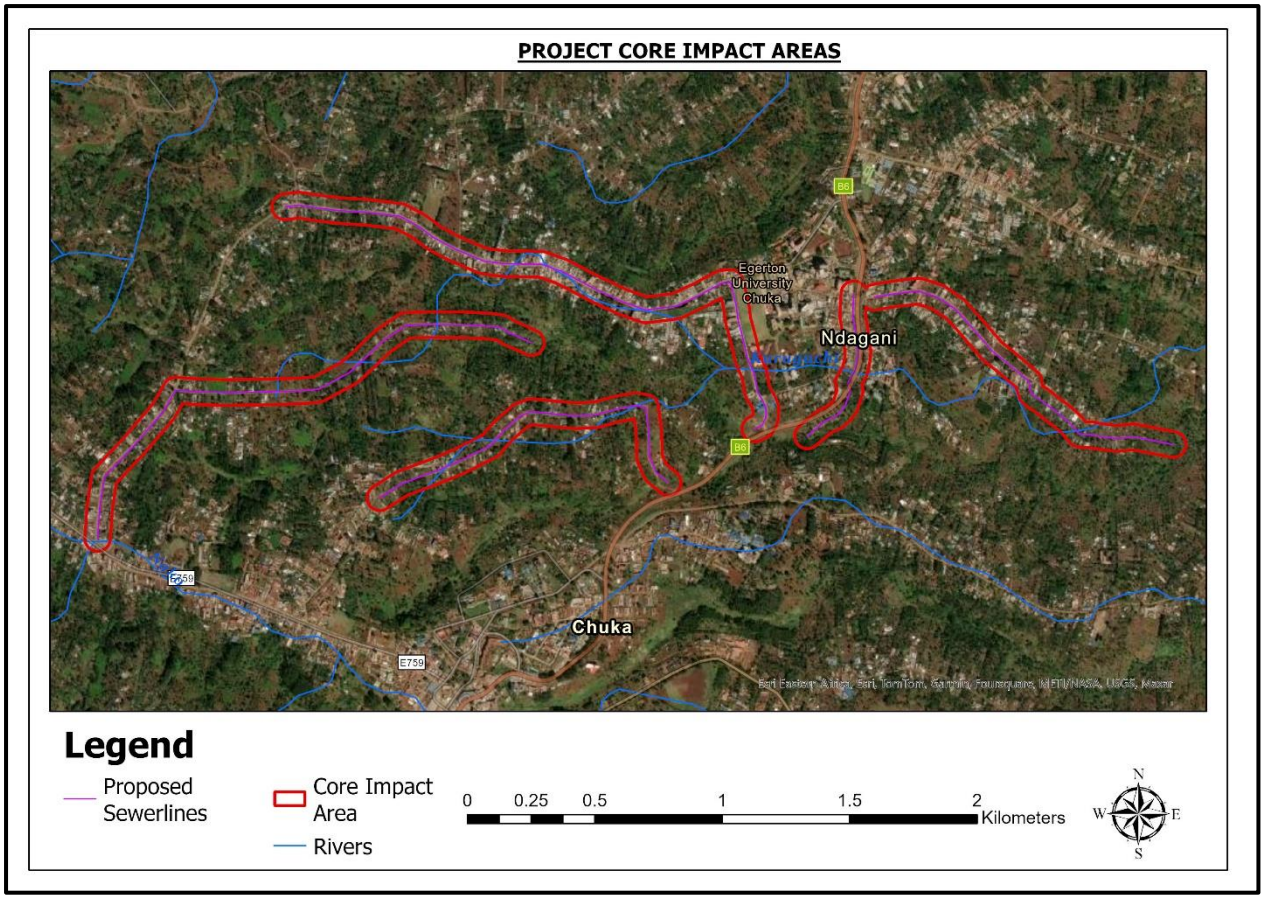

Figure 4-8: Core Impact Areas

Category	Description
Residential Areas	Twickenham Hostels, Executive hostels, shirwes hostels, ray hostels, Almark hostels, Blessed hostels, Karima Hostels.
Educational Facilities	Chuka University, Mungoni Youth Polytechnic, Chuka Furaha girls Highschool and Chuka Milimani.
Healthcare Facilities	St Lucy Hospital, Consolata Cottage Hospital, Kimbumbu Daily Care Clinic,
Community Facilities	Ndagani Market, SDA Chuka,
Environmental Habitats	None.
Water Sources	River Nako, River Kuruguchi.

5. CHAPTER FIVE: PUBLIC PARTICIPATION AND CONSULTATION

The Environmental (Impact Assessment and Audit) Regulations of 2003, requires that all ESIA Studies must incorporate Public Consultation. The aim of the PC is to ensure that all stakeholders interested in a proposed project (including project beneficiaries and the general public in the vicinity of the proposed project) are identified and their opinion considered during project planning, design, construction, operation and decommission phase. Public participation basically involved involving, informing and consulting the public in planning, management and other decision-making activities.

Public participation endures that due consideration is given to public values, concerns and preferences when decisions are made. It encompasses the public actively sharing in the decisions that government and other agencies make in their search for solutions to issues of public interest. Effective public participation requires the availability of adequate information in public inputs. The latter involves various values, critiques, questions, information, suggestions and other inputs, which are expressed by individuals, groups or organizations among the general public in an attempt to influence decision-making. Public consultations with interested and affected parties (IAPs) were done with the following aims:

- To inform the local people, leaders and other stakeholders about the proposed project and its objectives
- To seek views, concerns and opinions of people in the area concerning the project
- To establish if the local people foresee any positive or negative environmental effects from the project and if so, how they would wish the perceived impacts to be addressed.
- To find out if there are issues or places of cultural/or religious importance to the local communities that could be negatively impacted upon by the project and its infrastructure.

5.1. Stakeholder Engagement Plan (SEP)

A Stakeholder Engagement Plan has been prepared to provide guidelines through which TWWDA will engage its stakeholders in a structured, informed, inclusive and regular manner. The main objectives of the SEP are to:

- To establish a systematic approach for stakeholder engagement throughout the project cycles
- To identify key stakeholders that are affected by the proposed projects, their interests, concerns and influence in relation to project activities
- To promote and provide means for effective and inclusive engagement with project affected persons throughout the project cycle on issues that could potentially affect them
- Identify effective ways and methods to disseminate project information as per the needs of the stakeholders

- To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner
- To provide project affected parties with accessible and inclusive means to raise grievances and allow the project implementers to respond and manage such grievances

In line with the SEP requirements, the ESIA study team engaged relevant key stakeholders using various stakeholder engagement methods such as key informant interviews, focus group discussions, phone interviews, public barazas and household questionnaires. Stakeholder engagement and public consultation will be a continuous activity in all project phases. This will be guided by the Stakeholder Engagement Plan which provides guidelines for stakeholder's engagement in a structured, informed and inclusive manner. The next project activities that will necessitate stakeholder engagement are:

i. Disclosure of ESIA and RAP Reports
ii. Compensation of Project Affected Persons (PAPs)
iii. Grievance management at various levels
iv. Project implementation activities
v. Monitoring and Evaluation

In compliance with the requirements of the regulations, the proponent and the consulting team conducted several interviews with opinion leaders including the Members of the public administration, Sub County Water and sanitation officers, County environment Officers and other stakeholders. The consultation process included to a large extent structured questionnaires circulated to the relevant parties and interviews with relevant officers.

5.2. Public Participation Methodology

Public participation was mainly achieved through direct interviews, observations, questionnaire administration, holding stakeholder workshops and public meetings. The ESIA team began the public consultation process by holding preparatory meetings to strategize on how to engage the stakeholders in the ESIA process. This was done in consultation with the proponent and the public administration who helped in the process of identification of the significant actors/stakeholders who could provide data relevant to the proposed project

5.2.1. Public Meeting

Public consultation meetings were conducted on 14th, and 15th, February 2024 at Chuka precisely at Ndagani chief's office and Chuka Water offices. The primary aim was to facilitate meaningful engagement among a diverse range of participants, including beneficiaries of the Chuka Sewer Project, Project Affected Persons, administrative authorities, key county administration personnel, and local ward representatives. The meeting entailed communicating vital information regarding the proposed Last mile connectivity of the Chuka Sewerage Project.

Table 5-1: Public participation meeting attendance

DATE	VENUE	INTEREST	MALE	FEMALE	TOTAL
14th, Feb 2024	Ndagani Chiefs Office	Project Affected Persons and the Community	6	9	15
15th, February 2024	Chuka Water Office	Project Affected Persons and the Community	26	12	38

The objectives of the meeting included:

- To inform local people about the proposed development activities.
- To seek views, concerns and opinions of people in the area concerning the project
- Incorporate the information collected in the ESIA project report.
- To establish if the local people foresee any positive or negative environmental effects from the project and if so, how they would wish the perceived impacts to be addressed.

5.3. Comments and views from stakeholders and community

5.3.1. Opinion on Project implementation

Based on the comprehensive data collected from various sources, including Key Informant Interviews, meetings, and questionnaires, it is evident that the last mile connectivity of the sewerage project will play a pivotal and essential role in ensuring consistent access to proper sanitation. This achievement will have profound effects on elevating sanitation standards, improving hygiene, and ultimately enhancing the overall quality of life for the community. The feedback received from respondents echoes a unified sentiment, emphasizing their significant interest in the sewerage project. This collective viewpoint underscores the project's critical importance to the community. Besides the immediate benefits of improved sanitation, respondents also universally recognize the project's potential to positively impact the local economy, highlighting its contribution to sustainable livelihoods and holistic community development.

5.3.2. Issues of Concern from the Public consultation

Table 5-2: Summary of issues from public participation

Issue/Concern	Technical Team Response
Inquiry about compensation of affected individuals	Compensation for all directly affected persons will be diligently provided following the Resettlement Action Plan to be developed by the consultant.

Issue/Concern	Technical Team Response
Question regarding prioritization of local labour force	In efforts to stimulate the local economy, the contractor will prioritize hiring locals, particularly for unskilled positions.
Concern regarding the economic viability of land parcels after pipeline installation	Community members were assured that agricultural activities could continue on their land parcels post-installation, focusing on shallow-rooted crops like maize and beans. No structures will be permitted along the pipeline route to facilitate operational maintenance.
Dust pollution during excavation	The contractor will employ road sprinkling with water to mitigate dust pollution during project construction.
Noise pollution from project activities	The contractor will limit site activities during daytime, especially in sections with heavy machinery use, to minimize noise disturbance.
Accident prevention	The proponent will implement adequate safety measures for contractors and workers throughout project implementation.
Maintenance of excavated trenches	Trenches will not be left unattended to prevent accidents and hazards.
Pipeline passing through private land	The project will utilize road reserves to minimize compensation issues associated with private land passage.

The summary results of the consultation were as follows:

From the various stakeholder discussions,

- it was clear that the project was in full gear and has maximum support
- They do not object the proposed project.
- All confirm that the proposed development will not cause any negative environmental impacts to community at large and to environment in general
- They do not have any conflict in terms of land ownership

5.4. Grievance Redress Mechanism

A Grievance Redress Mechanism (GRM) is an instrument through which dispute resolution is sought and provided. It involves the receipt and processing of grievances from individuals or groups negatively affected by activities of a particular project. A Grievance Redress Mechanism (GRM) plays a critical role in preventing negative interruptions in project implementation occasioned by legal redress that are costly and time consuming. It spells out avenues to mitigate grievances from stakeholders and provides a legitimate, accessible and cost-effective avenue for receiving and addressing grievances whenever they occur.

5.4.1. Objectives of the Grievance Redress Mechanism

The objectives of the GRM are as follows:

- To provide and operationalize structures for receiving and addressing grievances emanating from project activities and providing feedback
- To sensitize stakeholders on existing avenues and channels for registering and resolving grievances
- To establish a trusting and respectful relationship between the Project and the community;
- To promote early identification of grievances and address them effectively and efficiently towards better manage of project impacts
- To promote good relations between the project implementers, executers and the local communities.
- Facilitate a learning culture, by means of analysing trends and patterns to drive continuous performance improvement and reduce repeat grievances thus improving project management decisions

5.4.2. Principles of the GRM

The effectiveness of this GRM will be guided by following principles:

- Accessibility – The GRM shall be accessible to everyone and at anytime
- Predictability –time bound at any stage with specified timeframes for the responses
- Fairness – The procedures herein are perceived as unbiased in regard to access to information and meaningful public participation
- Rights compatibility – The outcome of the mechanism should be consistent with the Bank and national standards and should not restrict access to other redress mechanisms
- Transparency and Accountability – The entire GRM process to be open and transparent and done out of public interest
- Culturally appropriate, thus sensitive to people's perceptions about fairness, justice and respectful solutions
- Feedback – The GRM to serve as a means of feedback from various stakeholders to improve project outcomes.

5.4.3. Types of Grievances

The GRM will solely be dedicated to handling grievances related or emanating from activities of the proposed projects under the National Urban Water Supply and Sanitation Programme. The type/ scope of grievances shall include those related to:

- Grievances and disputes emanating from compensation
- Inadequate stakeholders' consultation and participation at any stage of projects implementation
- Negative social and environmental impacts emanating from projects implementation
- Concerns on prioritization and/ or distribution of project interventions
- Concerns on social and environmental safeguards matters
- Cases of gender-based violence, particularly sexual exploitation and abuse/sexual harassment
- Any concerns/ complaints from stakeholders relating to contractors and consultants engaged during projects implementation

Any grievances that will be raised outside this scope shall be redirected to other GRMs discussed at national level. Matters that are within project management and coordination will also not trigger the use of this GRM and will be dealt with administratively within the projects.

5.4.4. The Grievance Redress Mechanism Structure

The GRM structure presents procedures and timeframes for grievance redress at various levels. Figure 1 presents the general steps for each grievance reported.

Grievance Management Procedure

All grievances reported shall be managed using the procedure illustrated in figure 5.1 below.

Figure 5.1: Grievance Management Procedure

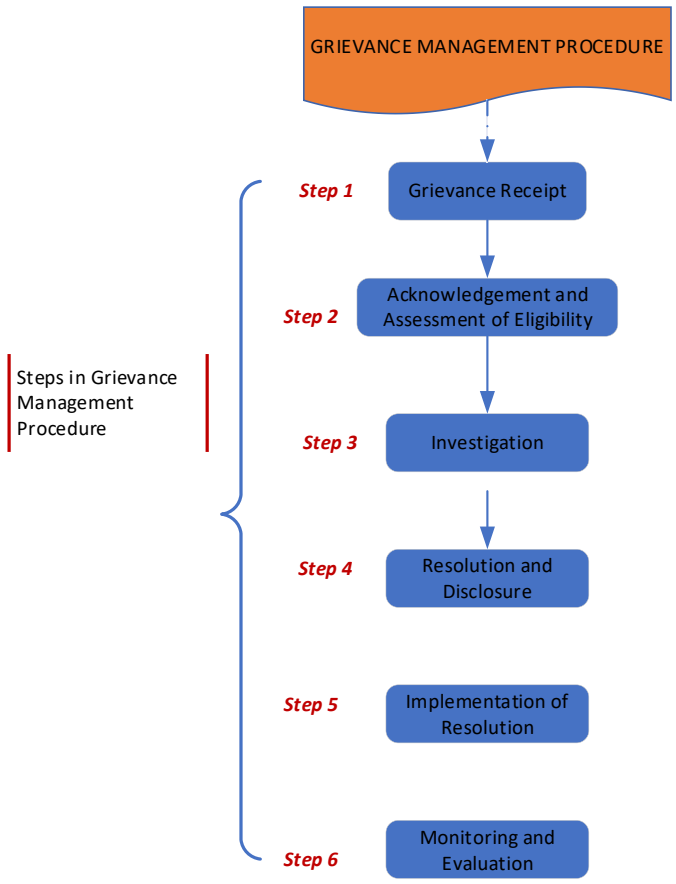

Figure 5-1:Steps in Grievance Readdress

A three-level redress mechanism targeting all stakeholders involved in project implementation will be adopted.

First Level of Redress: Community Level

The first level of grievance redress will be at the community level mainly targeting the local beneficiary communities and the project affected persons (PAPs). For every community at location level, a local grievance management committee shall be formed and trained to handle community grievances/ complaints emanating from the implementation of the proposed water supply and sanitation projects. The committee shall comprise of five members who shall include the local chief as the chair. The other members shall be nominated by the project beneficiaries ensuring gender balance and a representation of the vulnerable where applicable.[1]. The committee shall be trained by the community liaison officer from the local water service provider (WSP) on conflict resolution, group dynamics, project sustainability among other areas that shall be deemed necessary.

Step 1: Receipt of grievances

The mode of receipt of the complaints/ grievances may either be in writing, reported verbally, over the phone or emails. Once the local grievance management committee receives a grievance, the committee secretary shall be mandated to register the grievance.

[1] The committee should have at least two female members

The received grievance and relevant information related to the grievance shall be recorded on a standardized grievance register attached in appendix 1.

Step 2: Acknowledgement, assessment for eligibility and recording

The committee shall then determine the eligibility of the grievance received and if eligible, they shall notify the complainant and acknowledge receipt within three (3) days of receiving it. If not eligible, the complainant shall be informed of the reasons and advised on other existing GRMs to address his grievance. The complainant shall also be informed of the next steps and the timeframes including any further information/ documentation that maybe required to aid in investigation. The timeframes should not be later than twenty-one (21) days after the grievance is received.

Step 3: Investigation

The committee shall then set a day when all members are available and begin the investigation by assessing the seriousness/ severity of the grievance and classifying it either as high, medium, or low based on its impact to the complainant and the project. The assessment may necessitate the need for additional data collection through field visits to the sites, interviews with the relevant groups and follow up meetings with the affected groups to validate the information provided by the complainant. Minutes of such meetings shall be recorded and attached to the grievance report.

Step 4: Grievance Resolution and Disclosure

Depending on the findings and severity of the grievance, a resolution shall be decided immediately and the deliberations recorded in the grievance resolution form provided in the Appendix. However, if the grievance cannot be resolved by the local grievance management committee it shall be escalated to the county level and to the national level if not resolved at the county level. In cases where the complainant shall not be satisfied with the resolution given by the concerned committee, they shall be advised to report to the next level of redress. Also, in cases where the project GRM levels are unable to resolve the grievance, the complainant will be referred to the existing legal and judicial mechanisms in Kenya. This process should take a maximum of thirty (30) days from the time the parties are informed of the acceptance of the grievance.

Step 5: Implementation of the Resolution Mechanism

Once a resolution has been determined and the same communicated to the affected parties, an agreement shall be drawn outlining the following among other strategies for settlement of the grievance:

- Requesting the relevant agencies/ contractors responsible for the grievance to take appropriate measures to address the root causes of the grievance
- Determining reasonable compensation for loss from the accused parties
- Signing agreements between the accused persons and the project for solutions mutually agreed upon

Step 6: Grievance monitoring

The local grievance management committee shall then monitor the implementation of the grievance resolution mechanisms given and assess any further impacts of the project related grievances. They shall also monitor to ensure that the redress is granted to complainant in a timely and efficient manner and give regular feedback to the complainants about the progress.

County Level

The second level of redress will be at the county level where a county grievance management committee shall be established and chaired by a nominee of the proponent, TWWDA. The membership of the committee shall entail a nominee from the water service providers (WSPs), community liaison officers from the WSPs and the chairs of the various local grievance management committees in the County. The committee will also be trained in handling project grievances.

Just like the case with the first level of redress, once a complaint has been registered, the county grievance management committee will set a day to investigate the same and offer an action/ solution. If possible, a meeting will be held between the complainants and the concerned project officer to find a solution. Similarly, like in the first level of redress, a grievance resolution form shall be filled providing details of how the grievance was investigated and the recommended action provided. The resolution period shall be expected to take a maximum of fourteen (14) working days after which the complainant shall be notified through a grievance disclosure form. Grievances that shall not be resolved at this level shall be referred to the next level.

The county grievance management committees shall be obligated to submit a quarterly report using the standardized format provided in Appendix 4. of registered complaints to Tana Water Works Development Agency, TWWDA.

Third Level of Redress: National Level

At the National Level, a Grievance Handling Committee shall be appointed and equally trained to handle grievances. The committee shall be chaired by a nominee at the Ministry of Water, Sanitation and Irrigation, other membership shall include the CEO TWWDA, the project co-ordinators at TWWDA, the chairs of the county grievance management committees and a representation from TWWDA legal department. The ministry shall appoint a grievance handling officer who shall foresee operations of the committee. As in other levels, the reporting tools for other levels shall equally apply at national level reporting.

The resolution period at national level shall be expected to take a maximum of twenty (21) working days and the concerned shall be notified through the GRM/003 form. Should the grievance not be solved within this period, the complainant shall be advised to seek recourse through the legal and judicial mechanisms in Kenya discussed below.

TWWDA shall maintain databases and reports on all grievances and regularly conduct an assessment of the overall effectiveness and the impact of the GRM. The results of the assessment shall be used to improve the performance of the GRM and provide valuable feedback to project management.

National Arbitration Processes in Kenya

In the event that the complainants are dissatisfied with the outcome of grievance resolution, they shall be advised to seek recourse through the following national arbitration processes:

i. Commission on Administrative Justice (CAJ)
ii. National Environment Tribunal (NET)
iii. Land Acquisition Tribunal
iv. Courts

Commission on Administrative Justice (CAJ)

The Commission on Administrative Justice (CAJ) also known as the Office of the Ombudsman is an independent commission established by the Commission on Administrative Justice Act, 2011 pursuant to Article 59 (4) of the Constitution of Kenya. It is the foremost constitutional commission whose primary function is to ensure public officers and public institutions respect sovereignty of the people of Kenya. The CAJ is mandated to address all forms of maladministration, promote good governance and efficient service delivery in the public sector by enforcing the right to fair administrative action. The CAJ investigates abuse of power, manifest injustice and unlawful, oppressive, unfair or unresponsive official conduct.

National Environment Tribunal

Tribunals are an integral component of the justice system in Kenya and play an important role in reducing pressure on courts and facilitating expeditious access to justice. The Constitution of Kenya, 2010 recognizes tribunals as part of subordinate courts in the judicial hierarchy hence demonstrating their importance in the administration of justice in Kenya. The National Environment Tribunal (NET) is established under the Environmental Management and Co-Ordination Act (EMCA). The jurisdiction of the Tribunal is set out under section 125 of the Act. The Tribunal hears and determines appeals concerning: *grant of a license or permit or refusal to grant a license or permit; imposition of any condition, limitation or restriction on a license; revocation, suspension or variation of a license the amount of money required to be paid as fee under the Act or imposition against the person of an environmental restoration order or environmental improvement order by the Authority under the Act or its regulations*. The Act requires appeals to be lodged with the Tribunal within sixty days of the occurrence of the event which a person is dissatisfied with.8 In addition, the jurisdiction of the Tribunal extends to appeals against decisions of the Director General of the National Environment Management Authority (NEMA). All grievances related to project licensing by NEMA shall be referred to the National Environment Tribunal.

Land Acquisition Tribunal

The Land Act, 2012 was amended in 2019 to include Section 133A which provided for the establishment of a tribunal, the Land Acquisition Tribunal to hear and determine appeals from decisions of the National Land Commission in matters relating to the compulsory acquisition of land.

The jurisdiction of the Land Acquisition Tribunal is in respect of appeals from the decision of the National Land Commission (NLC) on matters compulsory acquisition, as per section 133C (1) of the Land Act. Further, section 133C (6) of the Land Act grants initial/first instance jurisdiction to the tribunal to deal with disputes on creation of wayleaves, easements, and public right of way. Also, as per section 133C (8) of the Land Act, the Land Acquisition Tribunal has the powers to uphold and enforce the Bill of Rights and review any administrative action as to compulsory acquisition. In summary, the LAT has jurisdiction on disputes regarding:

a. Compulsory acquisition of land
b. Wayleaves; easements; and public right of way
c. Upholding and enforcement of the Bill of Rights, as well as review of administrative action, as to compulsory acquisition

Even though, compulsory acquisition of land is not envisaged in this project, the role and provisions of the Land Acquisition Tribunal have been reviewed and provided as a precaution.

Courts

The Courts have power to hear and determine disputes, primarily of criminal and civil nature. Criminal cases are those in which the State prosecutes a person or an organization for committing an act which is not in the interest if the public, and therefore considered to be an offence against the state. Civil cases originate from a person who seeks redress for a private wrong such as breach of contract, trespass or negligence; or to enforce civil remedies such as compensation, damages or to stop some action.

Figure below presents a summary of the levels of grievance redress mechanism

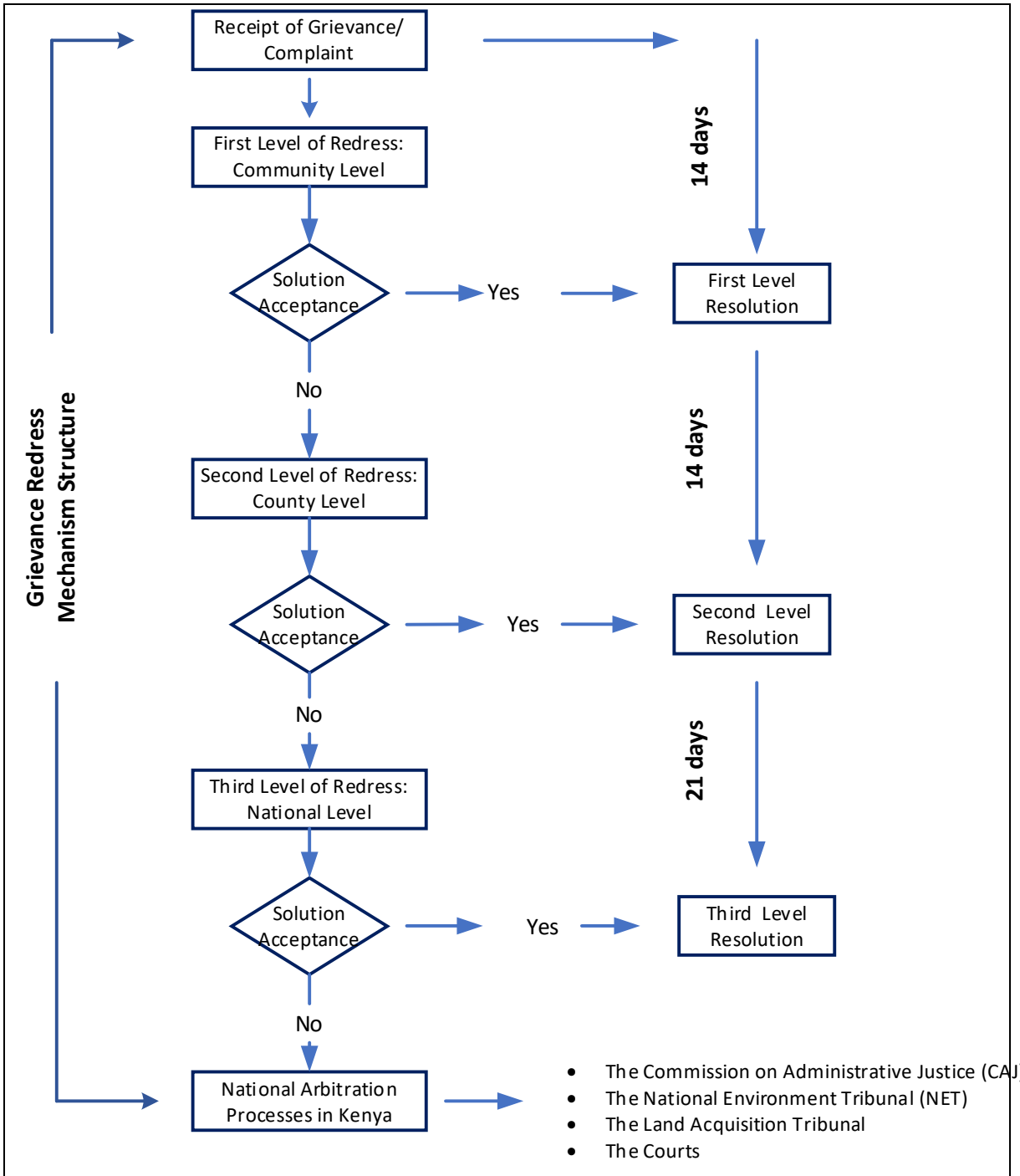

Figure 5-2:Levels of Grievance Redress Mechanism

6. CHAPTER SIX: DESCRIPTION OF THE ALTERNATIVES

Given the objectives of the project, the results of the policy and legal framework and key issues identified in the field, three alternatives were selected.

6.1. Alternative 1: Do nothing option/zero alternative/business as usual

The "no action" or no project alternative would maintain the status quo of the situation to Chuka Town residents. As such, the project proposed interventions would not be implemented. This alternative would thus result in the ongoing problems of water provision in the area.

This option would mean that the local and regional/national benefits would not be realized. With the "no-action" alternative, the potential health/hygienic and socio-economic benefits to the area would be foregone, and quality of life would remain at a low level. Long-term development plans for the area would be compromised and slowed down, since a reliable sanitation and the improved service associated with are to achieving the full benefits of other development initiatives and meeting the Sustainable Development Goals (SDG). Therefore, from both an environmental and social viewpoint, the "no-action" alternative is not preferable to project implementation.

6.2. Alternative 2: Relocation Option

The potential alternative of rerouting the proposed sewer project may be required to relocated the proposed surveyed lines to a different site. If pursued, the proponent would be tasked with identifying a new pathway, whether within or beyond the current project area. Several factors may lead to contemplating this option, including:

- **Infrastructure Compatibility**: Challenges related to compatibility with existing infrastructure, such as conflicts with utilities or transportation networks, could prompt consideration of relocation to facilitate smoother integration with existing infrastructure and minimize conflicts.
- **Incompatibility**: The project might be incongruent with other ongoing or planned developments in the vicinity.
- **Ecological Sensitivity**: The proposed routes' ecological sensitivity could necessitate relocation to minimize or prevent adverse effects on ecosystems, water bodies, or protected areas, ensuring compliance with environmental regulations and preservation objectives.

6.2.1. Findings

The proposed last-mile connectivity for the Chuka Sewerage Project poses no threat to existing ecosystems. The planned infrastructure not only avoids compromising future development plans for Chuka town but also serves as a foundational consideration for future urban developments. Rigorous survey and mapping have been conducted to ensure that the pipe routes do not intersect with sensitive ecosystems, including wetlands and forests. Moreover, as the sewerage will be conveyed via gravity, adequate surveying has been undertaken to ensure optimal flow efficiency while minimizing the risk of stagnation of sewers along the pipeline.

6.2.2. Implications

Choosing a different route for the sewer trunks would diminish the project's ability to benefit the intended people within Chuka. The sewer has been designed to flow using the conventional gravitational system where it's expected to flow with gravity to the treatment plant. Changes to the pipelines would lead to additional pumping charges and development of discharge bays for the sewer trucks disposal.

Just like the "no-action" alternative relocation option, would incur additional financial charges and losses due to the investments already committed to project design and planning. Furthermore, the process of surveying and identifying a new location is time-intensive. Even if a suitable site is found, there's a possibility that its costs might surpass the project's financial capacity, rendering it unaffordable.

6.3. Alternative 3: Alternative Waste Water Infrastructure

Having a sustainable infrastructure is essential because it directly affects all measures of sustainable development. As it is essential for every society and its economy, the sewage infrastructure system is a critical component in meeting the sustainable development goals. Furthermore, having a sustainable infrastructure can accelerate the balance of the economic, social, and environmental aspects of sustainable development.

Some of the alternative infrastructure to the proposed LMC for Chuka sewerage are outlined below:

6.3.1. Decentralized Treatment Systems

Decentralized treatment systems consist of smaller-scale treatment facilities distributed throughout a community or neighbourhood. These systems can include packaged treatment plants, decentralized membrane bioreactors, and small-scale activated sludge systems. Decentralized treatment systems provide flexibility, redundancy, and resilience to the overall wastewater management infrastructure

This would require that the proponent develops several decentralised systems to satisfy the needs of the entire project area. The decentralised infrastructure may require higher maintenance and operational costs compared to centralized systems. With also limited capacity for treating large volumes of wastewater as it is in Chuka. The system is prone to potential odour and aesthetic issues if not properly managed.

6.3.2. Onsite Sewage Treatment Systems:

Instead of connecting households to a centralized sewerage system, individual homes can utilize onsite sewage treatment systems like septic tanks or aerobic treatment units. These decentralized systems treat wastewater at the source, reducing the need for extensive sewer networks and minimizing environmental impact These systems include advanced treatment technologies such as membrane bioreactors, ultraviolet disinfection, and reverse osmosis. Treated wastewater can be reused for irrigation, industrial processes, toilet flushing, and groundwater recharge.

The onsite treatment systems may not be feasible for communal use as it I would incur a lot of costs to manage infrastructure at different locations. The systems require a lot of input from the proponent which may not work for the proposed project.

6.3.3. Greywater Recycling Systems

Greywater recycling systems capture and treat wastewater from sources like sinks, showers, and laundry machines for reuse in non-potable applications such as irrigation, toilet flushing, and outdoor cleaning. Implementing greywater recycling reduces freshwater consumption and eases the burden on sewage infrastructure. Grewater Recycling Systems Conserves freshwater resources by recycling greywater for non-potable uses further reducing strain on sewage infrastructure and wastewater treatment plants. On the other hand, these systems require separate plumbing systems and treatment infrastructure, increasing initial installation costs. In addition, day to day maintenance to ensure proper system operation and water quality may be required to ensure regulatory and public health concerns may be mitigated regarding the safe use of recycled greywater.

6.3.4. Natural Wastewater Treatment Systems:

Constructed wetlands or biofiltration systems can be employed as alternative wastewater treatment methods. These natural systems use vegetation and microbial processes to treat sewage, offering ecological benefits such as habitat creation and biodiversity enhancement while also effectively purifying water. Environmentally the technology might be feasible however, it requires significant land area for construction, which may be challenging in urban or densely populated areas such as Chuka. Performance can be variable depending on environmental conditions and plant species used. Long-term maintenance and management are necessary to ensure continued effectiveness. This might require huge financial capital for acquiring the scarce land resource and also maintaining the natural environmental conditions for efficient waste management

6.3.5. Vacuum Sewer Systems:

Vacuum sewer systems use vacuum pumps to transport wastewater through underground pipes to a central collection point. Vacuum sewer systems are particularly suitable for areas with difficult terrain or low population density. They require smaller pipes and shallower excavation compared to traditional gravity sewer systems.

The vacuum sewer systems would work in stances where there are difficult terrains in contrary to the proposed LMC where the treatment unit was set at the lower side of the project area where the sewer will be conveyed by gravity. The vacuum sewer systems require a higher initial capital cost compared to gravity sewer systems in addition dependence on vacuum pumps for wastewater transport, requiring backup power systems in cases of blackouts rendering it unsustainable.

6.3.1. Septic Systems:

Septic systems are individual wastewater treatment systems which consist of a septic tank and a drain field. Wastewater from the household flows into the septic tank, where solids settle and are partially decomposed by bacteria. The liquid effluent then flows into the drain field, where it percolates through the soil, undergoing further treatment before returning to the groundwater.

The infrastructure only works in small scale, developing it for a large-scale purpose in situations like Chuka might not efficiently work. The inefficiencies brought to the environmental might be so expensive to mitigate.

6.3.2. Implementation of the Sewer system as it is in the ESIA

Implementation of the proposed last mile connectivity for Chuka Sewerage project as it is in the design would create a more efficient system for collection and disposal of waste water from various targeted estates. This will alleviate sanitation problems particularly in peri urban areas and provide employment opportunities to locals during construction and operational phase. Even though some negative impacts such as disturbance of the utilities, noise, soil and water contamination associated with such a development maybe experienced, these negative impacts can be mitigated through various measures proposed in the Environmental and Social Management Plan (ESMP).

6.4. Alternative 4: Alternative Materials

The design approach for the Chuka Sewer LMC project involved an integration of hydraulic principles, material selection, and operational considerations to develop an efficient and resilient sewerage system tailored to the project's unique requirements. The primary focus was on ensuring optimal waste water conveyance, withstanding variations along different gradients, and minimizing operational and maintenance costs, all while upholding environmental sustainability.

After a thorough evaluation of various materials and criteria, DWC HDPE pipes emerged as the preferred choice for buried sections of the sewer pipeline. This selection was based on several factors including cost-effectiveness, ease of handling and installation, durability, local availability, and resistance to corrosion.

Other materials that were analysed for potential use in the Chuka Sewer LMC project include:

6.4.1. PVC Doubled Walled Pipes

PVC pipes could be considered for sections of the sewer pipeline where cost-effectiveness and resistance to corrosion are significant factors. PVC double wall pipes offer similar lightweight properties to DWC HDPE pipes, making them easy to handle and install. The pipes have good chemical resistance and are suitable for use in various sewerage environments. Additionally, they are generally less expensive than HDPE pipes, offering cost savings for the project.

However, pipes may have lower impact resistance compared to HDPE pipes, potentially leading to damage during installation or over time. PVC pipes are less flexible than HDPE pipes, which may make them more susceptible to cracking under certain conditions.

6.4.2. Concrete Pipes:

Concrete pipes might be suitable for sections requiring enhanced structural strength and durability. They could be considered for areas where the sewer pipeline needs to withstand heavy loads or harsh environmental conditions. However, their heavier weight and higher installation costs could be limiting factors. Concrete pipes have limited flexibility, which may pose challenges in curved or irregular sewer alignments.

The ESIA site visits site visits reveals that the environment in Chuka is not harsh enough to compromise the viability of DWC HDPE pipes. Despite the challenges posed by the environment, the DWC HDPE pipes were found to be capable of withstanding the prevailing conditions. On the other hand, concrete pipes were deemed uneconomical for the project due to factors such as higher costs and potentially unnecessary structural strength for the conditions present in Chuka. Therefore, based on the findings of the ESIA site visits, DWC HDPE pipes remain the preferred choice for the sewerage project in Chuka.

6.4.3. Composite Pipes:

Composite pipes, such as fiberglass reinforced pipes, could offer a balance between strength, durability, and corrosion resistance. They may be suitable for specific sections of the sewer pipeline where a combination of these properties is required. However, their availability and cost-effectiveness need to be carefully evaluated.

6.4.4. Ductile Iron Pipes:

Ductile iron pipes could be an alternative for sections of the sewer pipeline where high-pressure requirements or external load-bearing capabilities are essential. However, their heavier weight and higher material costs compared to HDPE pipes may impact overall project economics

6.4.5. Summary

After analysing various piping materials for the Chuka Sewer LMC project, DWC HDPE Pipe is recommended. The pipes exhibit durability, withstanding corrosion and rust, making them ideal for buried applications in Chuka's soil conditions. Their lightweight and flexible nature enables easier transportation, handling, and installation compared to heavier alternatives like steel, which is crucial for navigating the challenging terrain of the project area. Moreover, the local availability of HDPE pipes simplifies procurement processes and contributes to the growth of the local economy.

7. CHAPTER 7: ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The assessment of the proposed Last Mile Connectivity project for the Chuka sewer reveals that the implementation entails various impacts, encompassing both favourable and adverse outcomes. This section outlines these impacts across all project phases, highlighting positive effects along with enhancement measures, while addressing negative consequences with corresponding mitigation strategies. Through thorough evaluation, both the beneficial and detrimental aspects of the project have been analysed to ensure a balanced approach that maximizes benefits while minimizing adverse effects.

7.1. Positive impacts During Construction Phase

The positive impacts anticipated during construction and operations of the project are outlined below:

Employment opportunities to the local people. Temporary job opportunities shall be available during the construction phase of the project and shall include casual laborers, food catering, artisans, etc. This shall be an important positive impact to the community because unemployment has been cited as one of the most pressing problems in Kenya today.

Creation of market for construction materials. The Project will require construction materials, some of which will be sourced locally and some internationally. These include cement, sand, coarse aggregates, pump sets, steel pipes, valves, and chemicals. These will provide a ready market for suppliers in and outside the project area.

Skill Development: The construction phase of the Last Mile Connectivity for the sewer shall provide an opportunity for workers to acquire new skills and knowledge. Training programs and on-the-job learning experiences will enhance the capacity and employability of the local workforce.

Stimulation of the Local Economy: The influx of construction activities injects money into the local economy. Local businesses, such as suppliers of construction materials and equipment rental companies will benefit from increased demand, leading to business growth and expansion.

Infrastructural Improvement: The construction of last-mile connectivity will involve laying pipelines, and installing new sewage system connections. The project will not only focus on the sewerage systems but also ensure that the roads within the proposed sites are passable and accessible for transportation of materials. This will consequently enhance the overall infrastructure of the community, improving accessibility and connectivity for residents.

Community Engagement: Construction of the proposed project will often involve consultation with local community to address concerns and gather feedback. This engagement will foster a sense of community involvement and empowerment, as residents will have the opportunity to participate in decision-making processes that affect their neighborhoods.

7.2. Potential Impacts and Mitigation Measures During Pre-Construction Phase

7.2.1. Loss of livelihoods

The proposed Last Mile Connectivity (LMC) project entails the installation of sewer lines that may unavoidably traverse private lands. This necessitates for land acquisition that could potentially result in the displacement of people residing or working on these lands. Such displacement will pose significant challenges and risks to the affected individuals, including the loss of agricultural land, property, crops, or other sources of livelihood as described below

Loss of Agricultural Land: Agricultural land is often a primary source of livelihood for many residents in Chuka. Displacement due to land acquisition for the LMC project can lead to the loss of productive agricultural land, impacting farmers' ability to cultivate crops or rear livestock. This loss not only affects current livelihoods but also jeopardizes future food security and income generation opportunities.

Loss of Property and Infrastructure: Displacement may require individuals or communities to vacate their homes, resulting in the loss of property and infrastructure they have invested in over the years. This includes residential buildings, businesses, and community facilities, leading to financial losses and disruption of daily life.

Impact on Livelihoods: The loss of agricultural land and property directly affects the livelihoods of those displaced. Farmers may lose their main source of income, while business owners may struggle to recover from the loss of their establishments. Displacement can also disrupt access to essential services and employment opportunities, further compromising the economic stability of affected individuals and communities.

Psychological and Social Impacts: Displacement can have profound psychological and social impacts on affected individuals and communities. Forced relocation from familiar surroundings can lead to feelings of insecurity, anxiety, and loss of community cohesion. Displaced individuals may also face challenges in integrating into new environments and accessing support networks.

Compromised Project Affected Persons (PAPs): Project Affected Persons (PAPs) are directly impacted by the land acquisition process and subsequent displacement. Their ability to participate in and benefit from the project may be compromised due to the loss of land and livelihoods. Without adequate support and compensation, PAPs may face prolonged hardships and struggles to rebuild their lives.

To address these challenges, the following measures to mitigate the negative impacts of displacement:

- A Resettlement action plan for the sewer project has been conducted with an aim to ascertain the number of PAPs and the value of livelihood lost for compensation purposes.
- Providing fair and timely compensation to displaced persons, including compensation for lost land, property, and livelihoods.

- Offering support services such as vocational training, employment opportunities, and access to alternative land for agricultural purposes.
- Engaging with affected communities in the decision-making process and ensuring their participation in project planning and implementation.
- Implementing transparent and accountable grievance redress mechanism to address concerns and disputes related to displacement effectively.

7.2.2. Conflicts brought by compensation

The compensation process during the implementation of the Chuka sewer LMC project may bring about various conflicts and challenges within the affected communities. These conflicts can arise due to several factors, including:

1. **Discrepancies in Valuation**: Differences in the valuation of land and properties between the affected individuals and the project authorities can lead to conflicts. If the compensation offered is perceived as inadequate or unjust, it may result in protests or legal disputes.
2. **Disputes over Land Ownership**: Issues related to land tenure and ownership may emerge during the compensation process. Conflicting claims over land rights or boundaries could lead to disputes among neighboring landowners.
3. **Concerns about Adequacy of Compensation**: the PAPs may feel that the compensation offered does not adequately reflect the value of their land, property, or livelihoods. This perception of unfairness can escalate tensions and result in resistance to the project or demands for higher compensation.
4. **Perceived Fairness of the Process**: If the compensation process is perceived as biased, opaque, or lacking transparency, it can undermine trust and confidence in the project proponents. Community members may feel marginalized or excluded from decision-making processes, leading to resentment and opposition to the project.
5. **Delays and Uncertainty**: like other projects, delays in the compensation process or uncertainty regarding the timeline for compensation payments can exacerbate tensions and frustrations among affected individuals. Financial hardships caused by delayed compensation may further strain community relations and increase resistance to the project.

Mitigation Measures

- The proponent shall establish transparent criteria for compensation based on the extent of impact caused by the project, such as loss of land, property, or livelihood.
- The proponent should engage in continuous consultation with affected communities and stakeholders to understand their needs and concerns regarding compensation.
- The proponent shall develop a Resettlement Action Plan in line with the legal provisions outlining procedures for compensation, resettlement, and livelihood restoration for affected individuals and communities.

- The valuers should conduct fair and transparent valuation of affected properties and assets to determine compensation amounts.
- The proponents shall develop grievance redress mechanisms to address concerns and grievances related to compensation.
- The proponents shall offer legal assistance and advocacy services to affected individuals who may require support in navigating the compensation process.
- The proponent shall facilitate mediation and conflict resolution processes to address disputes or conflicts arising from compensation issues.

7.2.3. Social Disruption and Displacement

The displacement of individuals or communities due to land acquisition for the project can result in social disruption and dislocation. Displaced individuals may face challenges in resettlement, loss of social networks, and disruptions to their way of life, leading to resentment and resistance.

Mitigation Measures

- The proponent to facilitate open dialogue and consultation with affected communities throughout the project lifecycle.
- The proponent shall develop a comprehensive Resettlement Action Plan that outlines measures to address displacement, loss of livelihoods, and social disruptions.
- The proponent shall ensure that the RAP incorporates feedback from affected communities and adheres to relevant legal and international standards for involuntary resettlement
- The contractor and the proponent shall identify and protect cultural heritage sites, grave sites, landmarks, and traditions that hold significance for affected communities
- The proponent shall establish grievance redress mechanisms and conflict resolution processes to address disputes and grievances arising from the project.

7.2.4. Risk of conflicts during workforce recruitment (discrimination, child labour engagement)

- Priority of employment to be given to the local people
- Contractor to ensure equal opportunities in labour engagements for both men and women
- Contractor to adhere to the requirements of the Employment Act, Section 38 by keeping records of all workers engaged indicating date of employment, name, national ID number, age, sex, hours of work and wages paid
- Establishment of a project Grievance Redress Mechanism (GRM)
- Sensitization of workers on the project Grievance Redress Mechanism (GRM)

7.3. Potential Impacts and Mitigation Measures During Construction Phase

7.3.1. Disruption of road and service utilities

The Chuka Last Mile Connectivity of the Sewer Project involves significant construction activities that may disrupt roads and service utilities within the project area. Below a description of the potential disruptions:

Road Disruption: The surveyed lines show that the construction of sewer lines may require excavations along existing roads, leading to temporary closures or detours within the urban and peri urban area of Chuka. Road surfaces may become uneven or damaged due to construction activities, posing risks to motorists and pedestrians alike.

Service Utility Disruption: Excavations for laying sewer lines may interfere with existing service utilities including water pipelines, electricity cables, or telecommunication lines. Accidental damage to underground utilities during excavation can lead to service disruptions, affecting residents and businesses relying on these crucial services. Service providers may need to temporarily shut down utilities to facilitate construction, causing inconvenience to consumers and potential interruptions in essential services.

Mitigation Measures

- Conduct thorough utility mapping to identify the location of existing utilities to avoid heavy excavation along the utility routes.
- Coordinate with utility providers to ensure a clear understanding of the location and depth of utilities to avoid accidental damage during construction.
- Utilize trenchless methods such as horizontal directional drilling (HDD) or pipe jacking to install sewer lines without extensive excavation more so on road crossings. The methods minimize disruption to existing utilities by allowing the new sewer lines to be installed underground without the need for large trenches.
- The contractor should restore any damaged service utility within the shortest time possible utmost threshold of 6 hours within damage time
- Relocate or protect vulnerable utilities that intersect with the planned sewer line route.
- Provide advanced notification to utility providers, residents, and businesses about planned construction activities that may impact utilities.
- Maintain open communication channels to address concerns through the GRM and coordinate any necessary adjustments to utility services during construction.
- Establish protocols for immediate response, repair, and restoration of utility services to minimize downtime and inconvenience.
- Conduct regular monitoring and inspection of construction activities to ensure compliance with utility protection measures.
- Provide training and education to construction crews on the importance of utility protection and the proper procedures for working near existing utilities.

7.3.2. Access Limitations:

Construction activities within the proposed LMC for the sewer may limit or restrict access to certain areas along the project route, affecting businesses, residential properties, and public facilities. This will have a negative corresponding effect to enterprises within Chuka leading to financial losses.

Mitigation Measures

- The contractor to identify and establish alternative access routes to mitigate limitations caused by construction activities.
- The contactor should implement temporary access arrangements, such as temporary roads or pathways, to maintain access to affected areas during construction.
- The proponent to coordinate with local authorities to ensure the safety and functionality of temporary access routes.
- The contractor to establish scheduled access periods to allow residents, businesses, and emergency services uninterrupted access to affected areas.
- The contractor to appoint community liaison officers to facilitate communication between construction teams and affected stakeholders.
- Provide designated pedestrian pathways and crossings to ensure safe access for pedestrians in areas affected by construction.
- Provide regular updates and communication to affected stakeholders regarding access limitations, alternative routes, and construction progress.

7.3.3. Traffic congestion

The implementation of the Chuka LMC of the sewer project will entail activities such as excavation, trenching, and the laying of underground pipes. These activities have the potential to disturb the normal flow of traffic, necessitating measures such as road closures, lane restrictions, or rerouting. Heavy construction equipment and vehicles moving in and out of the project site can cause congestion and delays in traffic flow.

- Utilize trenchless methods such as horizontal directional drilling (HDD) or pipe jacking to install sewer lines without extensive excavation more so on road crossings.
- Implement traffic control measures, such as temporary traffic signals or flaggers, to manage traffic flow in areas with access limitations.
- Ensure proper signage and markings to guide motorists and pedestrians safely through construction zones.
- Schedule construction activities during off-peak hours or weekends to minimize disruptions to peak traffic flow.
- The contractor shall implement temporary traffic control devices including cones, barricades, and signage to guide motorists safely through construction zones.
- The contractor shall deploy trained flaggers and traffic wardens to manage traffic flow and ensure safe passage through construction areas.
- Provide regular updates on construction progress and anticipated traffic impacts to foster community understanding and cooperation.

- The contractor shall phase construction activities to minimize the length of road closures and lane restrictions, reducing overall disruption to traffic flow.

7.3.4. Loss of Biodiversity

The digging of trenches implies removal of existing vegetation and/or possibility of submerging of others. It is likely there will be loss and/or introduction of species. Downstream impacts are associated with regulated flows in the river, shifting of species to upstream areas.

There is also potential disruption of habitats downstream of the sewer project area as a result of construction activities discharge of excessive particulate matter, cement and other construction materials) as well as interrupted flow of water downstream.

Upon the digging of the trenches, the following impacts are anticipated;

- A completely new ecosystem will also be established around the inundated area. Planktons, periphytons and macrophytes will get established with implications on current natural life,
- This also has a linkage to the water quality that will range from improved aeration, pollutant removal,
- Vectors are part of the biodiversity, but will have negative implications to the residents. These include mosquitoes (associated with stagnant water), snails (carriers of bilharzia) and micro-organisms carrying other disease-causing germs (typhoid, cholera, dysentery, skin infections, eye infections, etc)

Mitigation

- Cultural and environmentally significant trees must be avoided at all costs.
- Whenever feasible, the contractor should selectively remove mature, native trees and vegetation.
- Unused areas around the project site will be restored to their original condition and enhanced with aesthetic appeal through the planting of indigenous trees.
- The site should be re-vegetated once site withdrawal is complete and choice of species should be as close to the previous species as possible

7.3.5. Waste generation

Solid waste will be generated from the excavation works. Some of the excavated soil will be reused as backfill while the rest will be disposed of to the designated areas. Solid topsoil wastes from the site will be the main form of solid waste. Other solid wastes will include metallic pieces, wooden planks, and stone debris.

Mitigation

- Implement a waste management plan to minimize waste generation during the construction phase.
- Prioritize the use of materials with minimal packaging to reduce waste.
- Encourage the reuse and recycling of construction materials whenever possible.
- Train workers on proper waste handling and disposal techniques to minimize waste generation.

- Utilize construction techniques that generate less waste, such as prefabrication and modular construction.
- Implement on-site segregation of waste to facilitate recycling and proper disposal.
- Partner with local recycling facilities to responsibly dispose of construction waste.
- Regularly monitor waste generation and adjust strategies as needed to minimize environmental impact.
- Promote awareness among workers and contractors about the importance of waste reduction and responsible disposal practices.
- Incorporate incentives or rewards for individuals or teams that successfully reduce waste generation on-site
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7.3.6. Soil Erosion and degradation

The disturbance of soil during excavation and trenching activities can lead to increased erosion, particularly in sloped areas, compromising soil stability and potentially causing sedimentation in nearby water bodies. Furthermore, the exposure of bare soil surfaces during construction leaves them susceptible to erosion by rainfall and runoff, exacerbating soil loss and sediment transport.

Mitigation Measures:

1. Establish temporary or permanent vegetative cover on disturbed soil surfaces to stabilize the soil and reduce erosion.
2. Install sediment barriers such as sediment traps or sediment ponds to capture sediment-laden runoff and prevent it from entering waterways.
3. Implement slope stabilization measures such as terracing or slope regrading to reduce the risk of soil erosion on steep slopes.
4. Re-plant the indigenous vegetation as much as practical once work is completed
5. Limit vegetation clearance unless where unavoidable circumstances appear;
6. Contain excavated soils so that they will not find their way into nearby water sources;
7. Cement mixing should be done in a designated area away at a safe distance from storm water drains;
8. Spilled cement or concrete should be collected and disposed away from natural water ways or storm water drainage;
9. Sensitize workers and enable them to properly handle concrete spillages or waste cement;
10. Re-vegetation of exposed areas around the site should be carried out rapidly in order to mitigate against erosion of soil through surface water runoff and wind erosion

7.3.7. Noise Pollution

During the construction, there is the potential for acceptable human noise levels that may be temporarily exceeded due to the operation of Lorries and heavy equipment in the working zone of the sewer project.

Noise abatement measures will be taken in the zones crossing the residential areas, including those agreed upon during work scheduling.

- Implement construction activities during off-peak hours to minimize disruption to nearby residents.
- Erect noise barriers or soundproofing materials around the construction site or camp areas to contain noise.
- Regularly maintain and lubricate construction equipment to reduce noise emissions.
- Schedule noisy activities for specific times of the day when noise impacts are expected to be lowest preferable 8AM – 5PM.
- In areas surrounding schools and institutions of learning schedule activities to weekends mainly
- Communicate with nearby residents about the construction schedule and anticipated noise levels.
- Implement noise monitoring programs to track noise levels and ensure compliance with regulations.
- Provide ear protection for workers to minimize their exposure to construction-related noise.
- Designate specific areas within the construction site for noisy activities to minimize impacts on nearby residents.
-

7.3.8. Air Quality Degradation

The digging of the trenches and transportation of construction material, earth movement and excavation may cause dust and air pollution. During dry weather, fugitive dust emissions as a result of mobilization and construction activities are likely to be very high, a precursor to respiratory tract infections.

To mitigate these impacts:

- Construction areas will be regularly watered to suppress dust emissions, reducing airborne particles.
- Trucks transporting loose materials will either be covered or required to have a minimum of two feet of freeboard to prevent dust generation during transportation.
- The project will be divided into phases to lessen the cumulative effects of dust emissions.
- Machinery will undergo regular maintenance to prevent the emission of harmful gases, ensuring efficient operation.
- Operators will be instructed to avoid unnecessary idling of vehicle engines and machinery to minimize emissions and conserve fuel.

- Wet methods such as water sprays will be employed to suppress dust, keeping particles from becoming airborne.
- Personal protective equipment (PPE) like nose masks will be provided to workers to safeguard against inhaling dust particles and ensure their safety.

7.3.9. Health and safety issues

Unsafe labour practices can have a significant impact on the health and safety of the workers and of the public. Worker productivity may be also adversely affected. It is anticipated that most unskilled and semi-skilled workers will be recruited locally so that there will be no significant influx of workers into the project area. Worker and public health and safety should be safeguarded at all times through application of health and safety measures required by law and by internationally accepted standards which need to be complied with.

Mitigation

- Conduct regular safety training sessions for all construction workers to ensure awareness of potential hazards and proper safety protocols.
- The contractor to employ a Environmental Health and Safety (EHS) Officer to supervise EHS Compliance
- Provide personal protective equipment (PPE) such as helmets, gloves, and safety goggles to all workers.
- Implement strict adherence to occupational health and safety regulations and standards.
- Conduct regular inspections of the construction site to identify and address any safety hazards promptly.
- Establish emergency response protocols and procedures to address accidents or injuries effectively.
- Ensure proper signage and barriers are in place to prevent unauthorized access to hazardous areas.
- Maintain clear communication channels between workers, supervisors, and project managers to address safety concerns promptly.
- Implement measures to control dust, noise, and other environmental pollutants to protect the health of workers and nearby residents.
- Regularly monitor air and water quality to ensure compliance with health and safety standards.
- Provide adequate first aid facilities and trained personnel on-site to respond to medical emergencies promptly.
- Encourage workers to report any safety concerns or incidents immediately to supervisors for appropriate action.

7.3.10.Spread of STDs and HIV

There will be migrant labour involved in construction which may take several months to complete. The community neighbouring the site will interact with the migrants to an extent that several communicable diseases whose prevalence may not be high presently may be more prevalent. Such diseases are venereal diseases which are communicable including AIDS.

Mitigation procedures are as follows;

- Community based organizations should conduct awareness programs around the area before commencement of the project to prepare the community for the possible impacts.
- Provide free condoms on site
- Health, safety and sanitation should be incorporated in education programs targeting the communities.
- Churches and provincial administration should also pass this message to their subjects.

7.4. Positive Impacts during the operation of the project

1. Improved Sanitation: the increased connection and access to proper sewage disposal systems shall help improve overall sanitation levels in the community, reducing the risk of waterborne diseases and improving public health.
2. Environmental Protection: Proper disposal of sewage will prevent contamination of water sources and reduce environmental pollution, preserving the local ecosystem and biodiversity in the long run.
3. Enhanced Quality of Life: Access to adequate sanitation facilities will contribute to a better quality of life for residents of Chuka by ensuring a clean and healthy living environment.
4. Economic Development: Improved sanitation infrastructure will attract investment and promote economic development by enhancing the liveability and attractiveness of the area for businesses and residents alike.
5. Social Equity: The project will promote social equity by ensuring that all members of the community, regardless of their socio-economic status, have access to essential sanitation services.
6. Sustainable Development: By providing sustainable sewage disposal solutions, the project will fulfil long-term sustainable development goal number 6, ensuring the well-being of current and future generations.
7. Increased Job Opportunities: During the operation phase of the Chuka sewer system, there are various employment opportunities which will benefit the local community. NIWASCO will be compelled to hiring personnel to operate and maintain the sewer system, including technicians, engineers, and operators responsible for monitoring, repairing, and servicing the infrastructure.

7.5. Negative Impacts During Operation

7.5.1. Public Health and Safety Issues

Occupation health and safety hazards during the operation and maintenance phases shall result from various sources and have adverse effects if not controlled within recommended limits.

Some of the risk sources are opening of air valve to vandalize water; disease vectors; water borne diseases. The air valves have high pressure and can lead to fatal accidents or even flooding of project area among other sewerage related accidents.

The following mitigation measures are recommended to enable safeguard against occupational health and safety impacts:

- Educate community against interfering with sewer infrastructure for example pipes and water valves;
- Conduct continuous monitoring to curb vandalism; monitoring can also be done through use of online electronic monitoring gadgets to enable curb vandalism on time;
- Ensure that, sewerage connection infrastructure is tested for integrity prior to commencing work.

7.5.2. Odour and Air Pollution:

The operation of sewage systems can sometimes lead to unpleasant odours and air pollution in the surrounding areas.

Mitigation Measures:

- Regular maintenance and cleaning of the sewer lines,
- Installation of odour control systems such as activated carbon filters or biofilters, can help mitigate odour and air pollution issues.

7.5.3. Potential Contamination of Water Sources:

Improperly maintained sewer lines or sewage leaks can result in the contamination of water sources, posing risks to public health and the environment.

- Mitigation Measures:
- Implementing regular monitoring programs to detect leaks
- Promptly repairing any damaged or leaking sewer lines can help prevent contamination of water sources.
- Ensuring that sewage treatment plants are operating effectively can reduce the risk of contamination.

7.5.4. Infrastructure Damage and Disruptions:

The operation of heavy machinery or vehicles required for maintenance and repairs of sewer lines can cause damage to roads and disruptions to traffic flow in the area.

Mitigation Measures:

- Proper planning of maintenance activities to minimize disruptions to traffic flow,
- Timely repairs of any damages caused to roads or infrastructure, can help mitigate this impact.

- Implementing traffic management plans and providing advance notice to residents about planned maintenance activities can help minimize inconveniences.

7.5.5. Vandalism

Vandalism of sewer infrastructure can have serious consequences, including service disruptions, environmental contamination, and costly repairs. To mitigate the risk of vandalism, the following measures can be implemented:

- The county government through NIWASCO shall educate the community about the importance of sewer infrastructure and the negative impacts of vandalism on public health, the environment, and community well-being.
- NIWASCO shall foster a sense of ownership and pride in the sewer system by involving local residents in its protection and maintenance.
- NIWASCO shall install clear signage indicating that the sewer infrastructure is protected by law and that vandalism will be prosecuted.
- The project proponent Consider situating infrastructure in areas with high visibility and natural surveillance to discourage vandalism.
- NIWASCO shall employ security personnel and community patrol appointees to monitor sewer infrastructure and respond promptly to any suspicious activities.
- NIWASCO shall collaborate with local law enforcement agencies and community organizations to establish neighborhood watch programs aimed at preventing vandalism and promoting community safety.
- The NIWASCO technical team shall ensure prompt repair of any damage to sewer infrastructure to minimize service disruptions and prevent further deterioration.

7.5.6. Social Disruptions:

The presence of sewerage infrastructure and associated maintenance activities may cause social disruptions and inconvenience to residents in the area.

Mitigation Measures:

- Engaging with the community through effective communication channels, providing timely updates on maintenance schedules, and addressing any concerns or complaints promptly can help minimize social disruptions.
- Involving local community members in the planning and decision-making processes related to sewerage system operation can foster a sense of ownership and cooperation.

7.6. Decommissioning and withdrawal

7.6.1. Loss of jobs

The decommissioning of the sewer project may lead to job losses, impacting individuals employed directly or indirectly in various project-related activities. This loss of employment can have economic and social repercussions on affected individuals, their families, and the community at large.

Mitigation Measures:

1. Establish social safety net programs, including unemployment benefits, job retraining grants, and financial assistance, to support affected workers and their families during the transition period.
2. Implement community development projects aimed at creating employment opportunities, improving infrastructure, and enhancing local amenities to stimulate economic growth and mitigate the negative impacts of job losses.
3. Notify the employees in advance on the Project closure date and adequately compensate them;
4. Dismissal procedures to be compliant with Employment Act, 2007;
5. Provide counselling & alternative skills for alternative activities;
6. Employer should find alternative means of livelihood for the staff who were employed at the sewerage project where possible.

7.6.2. Air Pollution:

During the decommissioning phase, vehicle emissions from transportation of materials and machinery activity can contribute to air pollution. Dust generation from site access and material piling could further degrade air quality, leading to respiratory issues and environmental pollution.

Mitigation

- Provide appropriate Personal Protective Equipment (PPE) for workers involved in decommissioning.
- Apply water on exposed areas and access roads to suppress dust emissions
- Transportation trucks carrying debris and scrap materials should be well covered

7.6.3. Solid Waste Generation:

Decommissioning activities can generate various types of solid waste, such as debris, concrete, and human waste. Inadequate handling and disposal of these wastes can result in environmental pollution and pose health hazards to workers and nearby communities.

- Execute careful demolition to maximize material reusability.
- Sell or donate reusable/recyclable materials to minimize waste.
- Adhere to an approved Decommissioning plan by the National Environmental Management Authority (NEMA) for proper site rehabilitation and waste management.

7.6.4. Water Pollution

The decommissioning process may contaminate nearby water bodies or groundwater sources. Activities such as pipe excavation and material handling can introduce pollutants into the environment, adversely affecting water quality and posing risks to aquatic ecosystems and human health.

- Implement a comprehensive waste management plan to handle, store, and dispose of materials and waste properly.

- Minimize the use of harmful chemicals or substances during decommissioning.
- Develop spill prevention and response protocols to handle any accidental releases of pollutants.

7.6.5. Noise and Vibration

Demolition works during decommissioning can produce significant noise and vibrations, causing disturbance to residents and disrupting local ecosystems. Increased noise levels can lead to annoyance, stress, and sleep disturbances among nearby residents.

- Schedule demolition activities during daytime hours when noise impact is expected to be lower.
- Choose demolition equipment designed to minimize noise emissions.
- Conduct regular maintenance of equipment to prevent excessive noise

7.6.6. Occupational Health and Safety Concerns

Risks associated with the decommissioning phase include accidents due to material movement, uncovered holes, and structures. Workers may be exposed to hazards such as falls, trips, and exposure to harmful substances if proper safety measures are not implemented.

- Supply proper Personal Protective Equipment (PPE) and provide safety training to workers.
- Establish designated pathways for machinery and personnel movement.
- Develop incident reporting mechanisms to address any safety concerns promptly.

7.6.7. Disruption of Ecosystems

Decommissioning activities may disrupt local ecosystems and habitats, leading to the displacement of wildlife and loss of biodiversity. Disturbance of soil and vegetation can result in erosion, habitat fragmentation, and loss of ecosystem services.

- Restore the land to its original state by revegetating the surrounding
- Development of a decommissioning plan to take care of the native ecosystem
- Conduct biodiversity assessment before decommissioning
- Unnecessary cutting down of trees should be avoided

7.6.8. Visual and Aesthetic Impact

The decommissioning phase may result in unsightly construction sites and temporary disruptions to the visual landscape. This can negatively impact the aesthetics of the area and reduce property values in the vicinity.

- The contractor to utilize landscaping techniques to camouflage construction areas, such as planting trees or shrubs.
- Schedule decommissioning activities during off-peak hours to minimize disruptions to the visual landscape.
- Coordinate with local authorities and stakeholders to ensure that decommissioning activities adhere to aesthetic guidelines and regulations.
- Restore the visual landscape post-decommissioning by cleaning up construction debris and restoring affected areas to their original state

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

This Environmental, Social, and Monitoring Plan (ESMMP) for the proposed project outlines a comprehensive framework designed to mitigate the environmental and social impacts associated with the project's implementation. The plan serves as a proactive strategy to address potential risks and ensure sustainable development throughout the project lifecycle. The ESMP aims to minimize adverse effects on local communities, ecosystems, and natural resources while maximizing positive socio-economic benefits. Utmost sustainability of the project shall be realized by integrating environmental and social considerations into the project design, construction, operation and decommissioning phases.

Through extensive stakeholder engagement, environmental assessments, and monitoring mechanisms, the ESMP seeks to identify, evaluate, and manage potential environmental and social risks associated with the Chuka Sewer LMC project. It has outlined a set of strategies, measures, and protocols to mitigate impacts on air and water quality, biodiversity, cultural heritage, livelihoods, and community well-being. Adhering to the guidelines outlined in the ESMP shall promote community resilience, and ensure the responsible management of environmental and social resources for the benefit of present and future generations.

Table 8-8-1: ESMMP for the Proposed LMC for Chuka sewerage Project

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Pre-Construction Phase					
Loss of livelihoods	High	• Prepare a comprehensive Resettlement Action Plan (RAP) for purposes of compensation for land, assets and crops for the Project Affected Persons (PAPs) • Prepare a Grievance Redress Mechanism (GRM) to guide all grievances and complaints emanating from compensation issues • Providing fair and timely compensation to displaced persons, including compensation for lost land, property, and livelihoods. • Offering support services such as training on financial management • Implementing transparent and accountable grievance redress mechanism to address concerns and disputes related to displacement effectively	TWWDA Consultant Team	• Minutes of PAPs consultation meetings • Comprehensive RAP Report • Grievance Redress Mechanism • RAP Implementation Report	750,000
Conflicts arising from compensation	High	• The proponent to facilitate open dialogue and consultation with affected communities throughout the project life-cycle.	TWWDA	• RAP implementation report capturing the	N/A

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		• Timely compensation in line with the agreements before the start of the project • Implementation of the developed project grievance redress mechanism to address disputes and grievances arising from the project		status of compensation	
Construction Phase					
Labour related conflicts during workforce recruitment (discrimination, child labour engagement etc)	Medium	• Priority of employment to be given to the local people • Contractor to ensure equal opportunities in labour engagements for both men and women • Contractor to adhere to the requirements of the Employment Act, Section 38 by keeping records of all workers engaged indicating date of employment, name, national ID number, age, sex, hours of work and wages paid • Implementation of the project Grievance Redress Mechanism (GRM) • Sensitization of workers on the project Grievance Redress Mechanism (GRM)	TWWDA Contractor Resident Engineer	• Staff records • Records of grievances resolved	350,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Disruption of road and service utilities	Medium	• The client to seek necessary permits from authorities such as KERRA and KURA • Conduct thorough utility mapping to identify the location of existing utilities to avoid heavy excavation along the utility routes. • Coordinate with utility providers to ensure a clear understanding of the location and depth of utilities to avoid accidental damage during construction. • Utilize trenchless methods such as horizontal directional drilling (HDD) or pipe jacking to install sewer lines without extensive excavation more so on road crossings. • The contractor should restore any damaged service utility within the shortest time possible utmost threshold of 6 hours within damage time • Relocate or protect vulnerable utilities that intersect with the planned sewer line route. • Provide advanced notification to utility	• TWWDA • Contractor	• Permits • Availability of safety signage in affected road sections	200,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		providers, residents, and businesses about planned construction activities that may impact utilities. • Maintain open communication channels to address concerns through the GRM and coordinate any necessary adjustments to utility services during construction. • Establish protocols for immediate response, repair, and restoration of utility services to minimize downtime and inconvenience. • Conduct regular monitoring and inspection of construction activities to ensure compliance with utility protection measures. • Provide training and education to construction crews on the importance of utility protection and the proper procedures for working near existing utilities			
Access Limitation	Medium	• Identify and establish alternative access routes to mitigate limitations caused by construction activities.	• Contractor	• Access paths and well communication	150,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		• Implement temporary access arrangements, such as temporary roads or pathways, to maintain access to affected areas during construction. • Coordinate with local authorities to ensure the safety and functionality of temporary access routes. • Establish scheduled access periods to allow residents, businesses, and emergency services uninterrupted access to affected areas. • Appoint community liaison officers to facilitate communication between construction teams and affected stakeholders. • Provide designated pedestrian pathways and crossings to ensure safe access for pedestrians in areas affected by construction. • Provide regular updates and communication to affected stakeholders regarding access limitations, alternative routes, and construction progress		structure and notices	

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Traffic Congestion	Medium	• Utilize trenchless methods such as horizontal directional drilling (HDD) or pipe jacking to install sewer lines without extensive excavation more so on road crossings. • Implement traffic control measures, such as temporary traffic signals or flaggers, to manage traffic flow in areas with access limitations. • Ensure proper signage and markings to guide motorists and pedestrians safely through construction zones. • Schedule construction activities during off-peak hours or weekends to minimize disruptions to peak traffic flow. • Install temporary traffic control devices including cones, barricades, and signage to guide motorists safely through construction zones. • Deploy trained flaggers and traffic wardens to manage traffic flow and ensure safe passage through construction areas.	• Contractor • TWWDA	• Traffic flow along the major trunks	100,00

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		• Provide regular updates on construction progress and anticipated traffic impacts to foster community understanding and cooperation. • Phase construction activities to minimize the length of road closures and lane restrictions, reducing overall disruption to traffic flow			
Health and safety Concerns	High	• Ensure that all construction machines and equipment are in good working conditions to prevent occupational hazards during excavation activities and laying of the pipes; • Establish a Health and Safety Plan for civil works areas ensuring the working hours are controlled and that employees are not allowed to extend the working hours beyond an acceptable limit for purposes of gaining extra pay; • Provide adequate manual labour to meet the requirements of the tasks; • Appoint a trained health and safety team for the duration of the construction work,	• TWWDA • Contractor • Resident Engineer	• Availability of PPEs and first aid kits • Availability of safety signage in appropriate areas • Availability of a Health and Safety Action Plan • Attendance list for toolbox talks • Up to date record for near misses, injuries and fatalities	5,000,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		monitor and advise appropriately on health and safety matters during the rehabilitation activities • Provide workers with gloves, ear gears, sturdy rubber boots and overalls to protect their skin from the effects of cement; • Provide workers training on safety procedures and emergency response such as fire and sewer pipe bursts			
Air quality Degradation	Low	• Vehicles and site trucks should be driven under the recommended speed of 40Km/h within public areas such as schools, and markets • Sprinkle water on degraded access routes to reduce dust emission during transportation of materials to project sites • Provision of dust masks to workers working in dusty environs	TWWDA Contractor Resident Engineer	Adequate PPEs to workers Records of traffic accidents involving site vehicles	250,000
Noise and vibrations brought by movements of heavy machinery and equipment	Low	• Implement noisy construction activities during off-peak hours to minimize disruption to nearby residents. • Erect noise barriers or soundproofing materials	TWWDA Contractor Resident Engineer	• Vehicle maintenance records • Availability of PPEs such as ear plugs	45,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		around the construction site or camp areas to contain noise. • Regularly maintain and lubricate construction equipment to reduce noise emissions. • Schedule noisy activities for specific times of the day when noise impacts are expected to be lowest preferable 8AM – 5PM. • In areas surrounding schools and institutions of learning schedule activities to weekends mainly • Communicate with nearby residents about the construction schedule and anticipated noise levels. • Implement noise monitoring programs to track noise levels and ensure compliance with regulations. • Provide ear protection for workers to minimize their exposure to construction-related noise. • Designate specific areas within the construction site for noisy activities to minimize impacts on nearby residents			

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Gender-based violence/harassment/abuse	Low	• All cases of gender-based violence (GBV) to be reported, investigated and resolved • Sensitisation of workers on issues of GBV	Contractor Resident Engineer	GBV Reports Training Reports	75,000
Spread of HIV/AIDS, STDs	Medium	• Worker's sensitization on HIV/ AIDs and other STDs • Provision of condoms to workers • Distribution of HIV & AIDS awareness materials in collaboration with National Aids Control Council (NACC)	Contractor Resident Engineer	Records of toolbox talks	250,000
Conflicts amongst workers and local communities	Low	• Develop a GRM for workers • Sensitization of workers on the project GRM and necessary procedures	TWWDA Contractor Resident Engineer	Training reports Grievance reports	250,000
Fire risks	Medium	• Provision of firefighting appliances in offices, stores, site vehicles • Regular training on fire risk reduction to workers during tool box talks	Contractor Resident Engineer	• Availability of firefighting appliances • Records of tool box talks	120,000
Poor hygiene and sanitation	High	• Provision of clean drinking water and sanitation facilities to workers at the work place • Provision of mobile toilets and water for sanitation purposes	Contractor Resident Engineer	Availability of clean drinking water and sanitation services on site	50,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Loss of Biodiversity	Medium	• Cultural and environmentally significant trees must be avoided at all costs. • Whenever feasible, the contractor should selectively remove mature, native trees and vegetation. • Unused areas around the project site will be restored to their original condition and enhanced with aesthetic appeal through the planting of indigenous trees. • The site should be re-vegetated once site withdrawal is complete and choice of species should be as close to the previous species as possible •	• TWWDA • Contractor •	County of trees lost and the vegetative cover	100,000
Waste generation	High	• Implement a waste management plan to minimize waste generation during the construction phase. • Prioritize the use of materials with minimal packaging to reduce waste. • Encourage the reuse and recycling of construction materials whenever possible.	• TWWDA • Contractor • Resident Engineer	Availability of a solid waste management plan	350,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		• Train workers on proper waste handling and disposal techniques to minimize waste generation. • Utilize construction techniques that generate less waste, such as prefabrication and modular construction. • Implement on-site segregation of waste to facilitate recycling and proper disposal. • Partner with local recycling facilities to responsibly dispose of construction waste. • Regularly monitor waste generation and adjust strategies as needed to minimize environmental impact. • Promote awareness among workers and contractors about the importance of waste reduction and responsible disposal practices. • Incorporate incentives or rewards for individuals or teams that successfully reduce waste generation on-site.			

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Interference with utilities i.e. • Blockage of drainage systems; • Excavation for creation of access routes and related structures.	Low	• The structures to be developed should be aesthetically acceptable to blend in with the surrounding; • The proponent shall as much as possible complete the works in such a way that natural aesthetics shall be retained at the locations • Restoration shall be undertaken to ensure that the original setting is as much as possible retained	• TWWDA • Contractor • Resident Engineer	Restored/ rehabilitated sites	N/A
Water pollution	High	• Isolate solid wastes disrupted from the works during excavations for safe disposal. The wastes should be collected and disposed in approved sites • Earth moving and excavations for the construction are carried out considering safety of the river and surface drainage. Control siltation of rivers and other surface drains • Ensure spilt oil does not discharge into water sources Provide oil spill containment including concrete platform for servicing of construction	Contractor Resident Engineer	Water quality tests	60,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		equipment and holding of scrap oil drums.			
Soil Erosion	Medium	• Re-plant the indigenous vegetation as much as practical once work is completed • Limit vegetation clearance unless where unavoidable circumstances appear; • Contain excavated soils so that they will not find their way into nearby water sources; • Cement mixing should be done in a designated area away at a safe distance from storm water drains; • Spilled cement or concrete should be collected and disposed away from natural water ways or storm water drainage; • Sensitise workers and enable them to properly handle concrete spillages or waste cement; • Re-vegetation of exposed areas around the site should be carried out rapidly in order to mitigate against erosion of soil through surface water runoff and wind erosion	Contractor Resident Engineer	• Rehabilitated sites • Incidents of soil erosion reported	30,000

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Operation Phase					
Odour	High	• Proper maintenance of the sewer infrastructure • Regular patrols to supervise leakages • Installation of leak detectors	NIWASCO	• Number of complaints on leakages	Operational Costs
Encroachment of wayleave	High	• Mapping and installation of beacons which illustrate the width of the pipeline reserve • Regular patrol of the pipeline corridor for encroachment • Prosecution of encroachers as required by County By-Laws on way leaves and road reserves maintenance. • Conduct public sensitization programs on way leave protection	NIWASCO	• Well maintained wayleave	To be determined
Vandalism	High	• Put in place proper security measures to guard the infrastructure and reduce cases of vandalism • Regular sensitisation of local community on importance of protection of the water infrastructure • Activate a community watch group for information sharing on the status of the sewer pipeline	TWWDA NIWASCO	Sensitisation Meetings and minutes	To be part of operational costs
Social Disruptions	Medium	• Engaging with the community through effective communication channels,	NIWASCO	Engagement minutes	To be part f the operational costs

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		providing timely updates on maintenance schedules, and addressing any concerns or complaints promptly can help minimize social disruptions. • Involving local community members in the planning and decision-making processes related to sewerage system operation can foster a sense of ownership and cooperation			
Occupational health and safety risks	High	• 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 • Provision of adequate PPEs to all workers e.g., safety shoes, helmets, gloves, overalls, dust masks etc • Display of appropriate safety signage to enhance awareness creation on the potential hazards involved during decommissioning	TWWDA Contractor NIWASCO	• Availability of PPEs and first aid kits • Availability of safety signage in appropriate areas • Records of Tool box talks • Attendance list	To be determined during development of a decommissioning plan

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		• Provision and display of emergency contacts in appropriate areas • Provision of a well-stocked first aid kit at all active sites and regular training of workers on basic first aid procedures • Acquisition of WIBA Insurance for all workers as per Work Injury Benefits Act, 2007			
Contamination of Water Sources	High	• Implementing regular monitoring programs to detect leaks • Promptly repairing any damaged or leaking sewer lines can help prevent contamination of water sources. • Ensuring that sewage treatment plants are operating effectively can reduce the risk of contamination.	NIWASCO	• Water Quality tests	TO be part of operational costs
Infrastructure Damage and disruption during repairs and maintenance	High	• Proper planning of maintenance activities to minimize disruptions to traffic flow, • Timely repairs of any damages caused to roads or infrastructure, can help mitigate this impact.	NIWASCO	• Number of disrupted services	Be part of operational costs

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		• Implementing traffic management plans and providing advance notice to residents about planned			
Decommissioning Phase					
Loss of jobs and income	High	• Notify the employees in advance on the Project closure date and adequately compensate them; • Dismissal procedures to be compliant with Employment Act, 2007; • Provide counselling & alternative skills for alternative activities; • Employer should find alternative means of livelihood for the staff who were employed at the sewerage project where possible.	TWWDA NIWASCO	Notice to employees	N/A
Air pollution	Low	• Speed control of site vehicles to a max of 40kph • Water should be sprayed on dusty excavated areas • Provision of dust masks to workers for use when working in dusty conditions • Use of serviceable vehicles and machinery to avoid excessive smoke emission	TWWDA NIWASCO Contractor	• Adequate PPEs to workers • Records of traffic accidents involving site vehicles	To be determined during development of a decommissioning plan

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
Water Pollution	High	• Implement a comprehensive waste management plan to handle, store, and dispose of materials and waste properly. • Minimize the use of harmful chemicals or substances during decommissioning. • Develop spill prevention and response protocols to handle any accidental releases of pollutants	TWWDA NIWASCO WRA Contractor	• Water quality tests	To be determined during development of a decommissioning plan
Noise and vibrations	Low	• Schedule noisy activities during the day time period • Use silencers on machines where possible; • Ensure machinery is well maintained to reduce noise emitted	TWWDA NIWASCO Contractor	NEMA license	To be determined during development of a decommissioning plan
Solid waste generation	Low	• Disposal of solid waste in compliance with EMCA 2006 Waste Management Regulations; • Segregation of waste to encourage reuse and recycling; • Engagement of a registered waste handler	TWWDA Contractor NIWASCO	Contracts and Licenses of the waste handler Waste recycling plan	To be determined during development of a decommissioning plan
Disruption of ecosystems	Medium	• Restore the land to its original state by	TWWDA NIWASCO Contractor	Tree and vegetation lost count	To be determined during development of a

Potential Impact	Impact Levels	Mitigation and Enhancement Measures	Responsibilities	Performance Indicator	Estimated Costs (KES)
		revegetating the surrounding • Development of a decommissioning plan to take care of the native ecosystem • Conduct biodiversity assessment before decommissioning • Unnecessary cutting down of trees should be avoided			decommissioning plan
Visual and aesthetic impacts	Medium	Rehabilitate/restore the site to its original state	TWWDA NIWASCO Contractor	Restored/ rehabilitated sites	To be determined during development of a decommissioning plan

8.1. Management Responsibility of the ESMMP

The management responsibility of the Environmental and Social Management and Monitoring Plan of the LMC will entail ensuring thorough implementation of measures aimed at mitigating environmental and social impacts across all phases of the project. This responsibility primarily falls on the project management team, comprising the project proponent, contractors, and relevant stakeholders.

The Key aspects of the responsibility include:

- Overseeing the execution of mitigation measures,
- Allocating resources for monitoring and training,
- engaging with stakeholders to address concerns and gather feedback.
- ensuring compliance with environmental regulations,
- fostering a culture of continuous improvement through regular reviews and evaluations to enhance environmental and social performance throughout the project lifecycle.

To ensure the effective implementation of the Environmental and Social Management and Monitoring Plan for the Chuka Sewer LMC project, it is crucial to delineate the roles and responsibilities of various entities involved. The table below outlines these roles and responsibilities:

Table 8-1-2: ESMMP Implementation Plan

Entity	Roles and Responsibilities in ESMMP Implementation
Tana Water Works Development Agency (TWWDA)	• Ensure that all project operations comply with internal environmental policies and the ESMMP. • Obtain all necessary authorizations, approvals, and licenses for project implementation. • Ensure that the Environmental Management Plan (EMP) is an integral part of the contract document with the Contractor and oversee its implementation. • Establish institutional linkages with relevant parties in project implementation as needed. • Conduct regular inspections of project activities to ensure compliance with social, health, safety, and environmental standards. • Address any non-conformity with the ESMMP attributable to the Contractor and take corrective actions as necessary.
National Environmental Management Authority (NEMA)	• Regulatory oversight to ensure compliance with environmental laws and regulations.

Entity	Roles and Responsibilities in ESMMP Implementation
	• Coordinate environmental management activities and promote the integration of environmental considerations into project policies, plans, and programmes. • Identify projects and programmes requiring environmental audits or monitoring under applicable laws. • Monitor and assess project activities to prevent environmental degradation.
Nithi Water and Sanitation Company (NIWASCO)	• Operate and maintain the sewage system to reduce non-revenue water. • Manage and respond to sewer spills, disinfect affected areas, and ensure proper environmental clean-up. • Conduct effluent quality analysis in collaboration with relevant government agencies. • Ensure treated wastewater and sludge meet health standards for reuse or disposal. • Regularly monitor and inspect facilities to prevent interference and maintain compliance with effluent discharge standards.
Contractor	• Develop and implement an ESMP implementation plan and health and safety plan within 30 days of contract signing. • Operate with valid licenses, approvals, and authorizations for project activities. • Prevent accidents and respond to incidents that may cause environmental damage. • Ensure compliance with environmental requirements and health and safety standards established in the contract. • Minimize environmental damage, waste, pollution, and impacts on surrounding areas and the public. • Provide appropriate Personal Protective Equipment (PPE) to workers and manage the complaints process.
Supervising Consultant/Resident Engineer	• Ensure the ESMMP is up-to-date and utilized by the contractor.

Entity	Roles and Responsibilities in ESMMP Implementation
	• Conduct periodic audits of the ESMMP to verify its performance and compliance with expectations.
County Government of Tharaka Nithi	• Provide necessary permits and advisory services to project implementers as required during project implementation.
Directorate of Occupational Safety and Health Services (DOSHS)	• Register the project site as a work station and enforce relevant provisions of occupational safety and health laws.
Water Resource Authority (WRA)	• Monitor and enforce conditions attached to water permits and use. • Regulate and protect water resources quality from adverse impacts. • Regulate and protect water resources infrastructure, use, and effluent discharge. • Collaborate with beneficiary communities to manage and protect water catchments. • Establish water resources monitoring networks to ensure sustainability and environmental protection.

8.2. Monitoring

The environmental monitoring schedule for the proposed Chuka Sewerage LMC project aims to ensure effective implementation of mitigation and enhancement measures and prompt response to emerging concerns. It encompasses pre-construction, construction, and operation phases, with activities tailored to each phase. Monitoring shall involve various levels, including contractor-led monitoring at work sites, overseen by a Supervision Consultant who will report to the project proponent (TWWDA). It is advised that the selected contractor employs a local environmental health and safety specialist who will oversee compliance to the environmental health and safety issues along the construction of the pipelines. Internal monitoring by the proponent will verify the contractor results and audit mitigation measures' implementation. The objective is to identify environmental hazards, ensure compliance with legal requirements, and assess project activities against approval criteria. The responsibility for mitigation monitoring during the operation phase rests with the Environmental Section of the Water Service provider (NIWASCO), covering key parameters such as water quality, waste management, and environmental compliance.

8.2.1. Monitoring of Environmental Health and Safety Issues

The proposed LMC for Chuka Sewer Project poses inherent risks and hazards associated with various activities. Regular checks and monitoring are essential to assess the effectiveness of mitigation measures and address any emerging issues promptly. Table 8-2 outlines a

monitoring plan that includes key verifiable indicators for assessing and mitigating the occupational Safety and Health Issues. The indicators serve as crucial benchmarks for ensuring compliance with environmental, social, and safety standards throughout the project lifecycle, facilitating proactive risk management and sustainable development practices.

Table 8-1-3: Monitoring EHS issues

Monitoring Parameters	Responsibility	Monitoring Location(s)	Time/ Frequency	Indicators
Machinery and equipment safety	Contractor	At work stations	Weekly	Servicing records
Electrical Safety	Contractor	At stations, camp and offices	Daily	Poor electrical connections and uninsulated cables
Accidents, incidents, injuries etc.	Contractor	At work stations	Daily	The general register records for the site.
House keeping	Contractor	At stations	Daily	Site organisation
Dust pollution	Contractor	At work stations	Daily	Air particulate matter on site
Noise emissions	Contractor	At work stations	Daily	Noise monitoring records
WASH and Welfare	Contractor,	Construction stations and offices	Weekly	Presence of sanitation & welfare facilities
Oil Spills and Leakages	Contractor	Workers camps and construction sites	Daily	Records of daily inspections
Solid Wastes	Contractor	Workers camps, construction sites Site offices	Daily/weekly	Inspection and waste disposal records

8.2.2. Water Resources Monitoring

Table 8-1-4: Water Resources Monitoring

Monitoring Parameters	Responsibility	Monitoring Measures	Time/Frequency
Contamination of water resources by poor waste management	TWWDA NIWASCO, WRA	Undertake water quality monitoring throughout the construction period and even after construction	Records of site inspections and water analysis
Contamination of water resources by pipeline construction	TWWDA NIWASCO, WRA	Undertake water quality monitoring throughout the construction period and even after construction	Review of records

8.2.3 Soil Erosion Monitoring

Excavation activities carried out during the development of sewer lines can exacerbate soil erosion due to the disturbance of soil structure and vegetation cover. When soil is excavated, it becomes more susceptible to erosion by wind and water, especially during periods of heavy rainfall or strong wind. To mitigate the adverse impacts of soil erosion, monitoring becomes essential to preserve the environmental integrity of the soil. Monitoring activities should include regular assessments of erosion risk factors such as slope steepness, soil type, rainfall patterns, and vegetation cover. Monitoring should extend beyond the construction phase to encompass the entire project lifecycle, including the operational phase.

Table 8-1-5: Soil erosion monitoring

Monitoring Parameters	Responsibility	Mitigation Measure	Monitoring Measures	Frequency of Monitoring
Soil Erosion	TWWDA Contractor	• Natural revegetation following construction • Reinstatement and recontouring of soils • Proper handling of soil to preserve	Records of date, soil type and removal date will be made during soil stripping process to ensure the top soil is maintained to allow natural revegetation	Daily Records

Monitoring Parameters	Responsibility	Mitigation Measure	Monitoring Measures	Frequency of Monitoring
		different soil layers		
Soil pollution through contamination by hazardous waste	TWWDA Contractor	• There will be set procedures for handling, storage, treatment and disposal of hazardous waste according to appropriate standards Secondary containment structures will be used where there is storage of hazardous materials to reduce potential contamination Limit the volume of hazardous substances to only what is required to reduce potential contamination	In case of contamination, a risk assessment will be done to ascertain the cause of contamination, treatment and disposal option. Records of waste handling and disposal to NEMA licensed disposal site will be maintained Quality analysis of soil samples will be undertaken quarterly to assess any possibility of contamination	Daily Site inspections and quarterly chemical analysis of soil and water
Contamination of soil by waste disposal	TWWDA Contractor	Waste will be disposed of at NEMA licensed waste facility		Daily observations and inspections
Contamination of soil by fuel and oils	TWWDA Contractor	Installation of oil water separators	Define the frequency and extent of soil sampling to be conducted at suitable depths to assess any	Regularly

Monitoring Parameters	Responsibility	Mitigation Measure	Monitoring Measures	Frequency of Monitoring
		and grease straps at refuelling facilities, workshops and parking yards, fuel storage and containment areas in order to reduce potential contamination	possibility of contamination	

8.2.4 Noise Levels Monitoring

Although noise during construction is expected to be a problem, periodic sampling of Contractor equipment and at work sites should be undertaken to confirm that it is not an issue. Noise level monitoring could be supplemented by consulting with Project Affected People in the first instance to identify the level of monitoring required.

8.2.5 Air Quality Protection

The Construction Contractor shall monitor wind velocity and site dust levels during earthmoving activities. The Construction Contractor shall also monitor emissions from vehicles. If excessive dust is generated, the Construction Contractor shall immediately water down areas generating dust or, if this is not effective, cease the activities generating dust. Stop all excavation work if wind threshold velocity has been exceeded.

8.2.6 Waste Management Monitoring

The Construction Contractor shall regularly monitor the management of wastes to ensure that;

- All stored waste shall be contained within construction sites;
- Solid waste: all site waste is to be collected and disposed of in an approved site. Where possible segregation of waste (paper, glass, metal) should be undertaken and recycling opportunities identified.
- The Construction Contractor shall ensure that all workers have been inducted. The Construction Contractor shall regularly monitor that occupational health and safety requirements are implemented. The client representative shall audit that all requirements are met. Where occupational health and safety requirements are not

being implemented relevant workers shall immediately be trained and instructed to implement these requirements.

8.3. Decommissioning Plan

The Chuka sewer project is designed to operate effectively for a period exceeding 20 years. Prior to the commencement of decommissioning activities, the project proponent will develop a comprehensive Decommissioning plan. This plan will outline various activities, including:

- Identification of infrastructure, buildings, and structures to be retained, along with proposals for alternative uses and further development of retained infrastructure. Additionally, it will detail the infrastructure and structures earmarked for dismantling, removal, recycling, or disposal.
- Environmental Restoration Plan: This plan will address the restoration of sites affected by decommissioning activities, such as backfilling open pits, restoring disturbed vegetation, and replanting grass or trees.
- Waste Management Plan: A formal waste management plan will be developed to ensure proper handling and disposal of both solid and liquid waste in compliance with applicable laws and regulations.
- Health & Safety Plan: Implementation of a comprehensive health and safety plan to safeguard the well-being of workers and the public. This includes establishing and operating emergency evacuation procedures for potential casualties.
- Social Impact Mitigation: Mechanisms will be put in place to address project-related social issues, ensuring that the decommissioning process considers the needs and concerns of local communities.
- Consideration of Development Plans: The strategy will take into account existing regional and national development plans relevant to the project area to ensure alignment with broader socio-economic objectives.

In the event that infrastructure overhaul is required, a structured approach will be followed to minimize impacts on both the human and natural environment. The steps for overhauling infrastructure are outlined in Table 8.6 below:

Table 8-1-6: Overhaul Process

Stage	Action	Actor
Step 1	Initiation	Development of an Objective Worksheet and checklist incorporating references, legal and policies. Undertake decommissioning audit.
Step 2	Prepare Road Map for Decommissioning Design	Conduct design review to validate elements of the design and ensure design features are incorporated

		in the decommissioning design. Public consultations.
Step 3	Prepare and Award Contract	Prepare a contract that incorporates validated project information and award it to a contractor as per procurement rules.
Step 4	Execute Decommission Works	Implement design elements and criteria on the project in accordance with specifications and drawings. Inspect during decommissioning and at project completion to ensure that all design elements are implemented according to specifications.
Step 5	Commissioning Environmental Management Plan	Contractor

9. CHAPTER TEN: CONCLUSION AND RECOMMENDATION

9.1. Conclusions

Based on fieldwork, environmental and social impact assessment, as well as consultations with the public and stakeholders, it was resolute that the project will play a crucial role in improving sanitation systems for the residents of Chuka. While the project is expected to bring about significant adverse social and environmental effects, it will also yield numerous positive impacts during its operational phase. The evaluation reveals that the positive outcomes outweigh the negative ones. Furthermore, most adverse effects are anticipated to be temporary, particularly during the construction phase, and can be effectively managed with the implementation of recommended mitigation measures. The identified negative impacts are generally of moderate severity or lower and can be readily addressed.

9.2. Recommendations

Based on the evaluation of the findings, the ESIA has identified potential environmental and social impacts associated with the project and has provided mitigation measures to address the concerns effectively. Approval of the project is recommended, with the condition that the proposed mitigation measures and monitoring plans are implemented rigorously to minimize any adverse impacts and ensure the sustainable development of the Chuka sewerage system. In addition, it is recommended that:

- The proponent and the project coordination unit should ensure active involvement of local community, government agencies, and other relevant stakeholders throughout the project lifecycle.
- The proponent should implement a robust environmental monitoring program to track and assess the impacts of construction and operation activities on air, water, soil quality, and biodiversity.
- Effective mitigation measures should be taken by the contractor during construction and NIWASCO during operation to minimize environmental degradation, including erosion control, waste management, and habitat restoration, should be conducted throughout the phases in accordance with regulatory requirements.
- The project coordination unit and the contractor shall ensure strict compliance with environmental regulations and standards by conducting regular audits, inspections, and assessments during construction and operation phases.
- The contractor shall prioritize worker safety and health by providing adequate training, personal protective equipment and emergency response procedures to mitigate risks associated with construction activities.
- The proponent in conjunction with the contractor shall foster positive community relations by addressing concerns, providing timely information, and implementing measures to minimize disruptions to local communities during construction and operation through the GRM.

- NIWASCO the water service provider who the project shall be bestowed upon, should establish a post-construction monitoring program to assess the long-term impacts of the project on the environment, social fabric, and local economy, and implement adaptive management strategies as needed.
- TWWDA in collaboration with NIWASCO should invest in capacity building initiatives to enhance local skills and expertise in environmental management, construction techniques, and operation maintenance to ensure the sustainability of the project beyond its completion.

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ANNEXURES

ANNEX 1: COMMUNITY ENGAGEMENT MINUTES

Chuka Sewer Minutes_24 March 2024.pdf

Ndagani -chuka sewarage LMC project Minutes.pdf

ANNEX 2: COMMUNITY ENGAGEMENT ATTENDANCE LIST

Chuka Sewer Attendance List.pdf

ANNEX 3: PUBLIC PARTICIPATION QUESTIONNAIRES

Questionnaires_Chuka Sewer LMC.pdf

ANNEX 4: EIA License

Chuka Sewer_EIA License.pdf

ANNEX 5: Photo Gallery

	
Official from NIWASCO giving remarks at Ndagani	Ms Wairimu an Environment expert attending to issues raised by community members at Ndagani
	
The area Assistant Chief addressing the community members at a public consultation forum at Chuka Water Office	Mr. Mutuma the team leader addressing concerns of community members during public consultation at Kibumbu in Chuka

	
Ms. Phylis a community member asking a question during the consultation exercise	A community member adressing the community consultation meeting at Ndagani

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Minute of Public Participation

THE PUBLIC PARTICIPATION MINUTES FOR LAST MILE CONNECTIVITY OF THE CHUKA SEWER SUPPLY PROJECTS HELD ON 25TH, MARCH 2024 AT NDAGANI CHIEF'S CAMP IN THARAKA NITHI COUNTY AT 15OO HRS

MEMBERS PRESENT

- Area Chief
- Project Affected People (PAPs)
- TWWDA (Legal and Technical Team)
- Greenville Consultant (RAP and Environment Team)

(Enclosed Attendance List)

AGENDA

The agenda of the meeting was as follows:

- Preliminary Matter
- Update Regarding the Chuka Sewer Line
- Comments and Concerns of the Community
- Conclusion
- Closing Remarks

MIN 1/03/2024: PRELIMINARY MATTER

- **Meeting called to order:** Area Chief Mr. Njagi called the meeting to order at 3:00 PM. A community member opened the meeting with a prayer.
- **Welcome and Introduction:** The Area Chief welcomed participants, including representatives from the Tana Water Works Development Agency and the consulting team. He provided a brief update on the current sewerage project status and encouraged active community participation and feedback.
- The consultant representative Introduced his team
- Mr. Mwenda from the TWWDA also introduced the team and provided an overview of the proposed project.

MIN 2/03/2024: UPDATE REGARDING THE NDAGANI SEWER LINE

- **Consultant Introduction:** Mr. Mutuma (consultant) introduced the team and outlined the project background. He identified sections where the sewer line would cross private property, noting concerns raised by some residents. He confirmed that the design phase involved collaboration with stakeholders to investigate potential rerouting options to address landowner concerns.

- **Resettlement Action Plan:** Mr. Onyimbo (consultant) presented the results of the Resettlement Action Plan (RAP). He thanked the Project Affected Persons (PAPs) for their cooperation throughout the process. He confirmed that all affected individuals will be compensated according to Kenyan law and AfDB requirements. He asked if there were any objections to the project, and those present voiced their support.

MIN 3/03/2024: COMMENTS AND CONCERNS OF THE COMMUNITY

NAME OF THE CONCERNED MEMBER	QUESTION ASKED	RESPONSE
• Phineas Mwenda	• **Long-term Impact**: What are the potential long-term repercussions of the sewer line crossing our private property? We understand the **immediate** compensation, but are there future risks or limitations we should be aware of? • **Land Use Restrictions**: Will the presence of the sewer line restrict how we can use our land in the future? Will it affect our ability to build, farm, or make other changes on the affected areas? • **Alternative Routes**: We strongly request that the line be re-routed to minimize the impact on private property. Even within my own land, **could** the line be placed closer to the boundary rather than cutting through the middle of my property?	• We understand and appreciate the valid concerns raised by landowners. Here's how we plan to address potential issues: • Long-term Impact: While there will be some initial disruption, the sewer line is designed to operate with minimal long-term impact. Property owners will be provided with clear information about any easements related to the line. We are committed to regular maintenance and ensuring minimal future disruption. • Land Use Restrictions: The sewer line may introduce some necessary restrictions within a designated zone around the line itself. We'll provide detailed documentation outlining these restrictions to ensure you fully understand how it might affect your future land use plans. • Alternative Routes: We're actively exploring alternative routes to minimize the impact on private property. Even within your land, we'll investigate adjustments, such as placing the line closer to the boundary, to better accommodate your needs. We'll present updated route proposals for community feedback as soon as possible.
• Ian Munene	• "I am concerned that the current alignment of the proposed sewer line infringes on my ability to develop my property according to its designated use. I have recently secured legally authorized permits for constructing a home on the land. Unfortunately, the current placement of the line would create a substantial obstacle to implementing these approved plans. I respectfully request that the project team	• Thank you for bringing your concerns to our attention. We understand the importance of respecting landowners' existing plans and approved permits. We'll carefully review the current sewer line alignment and investigate the feasibility of rerouting it. We aim to find the best solution to accommodate your construction project while ensuring the successful completion of the sewer line.

	consider rerouting the line to the perimeter of my property, allowing me to proceed with my permitted construction project."	
• Kelvin Kinyua	• He was concerned that the line passes directly in front of his newly built house, he is embracing the project and said he would be ready to accept it if it were further from his front door	

MIN 4/03/2024: CONCLUSION

Land Use Impact: Attendees expressed concern that the sewer line's original route would significantly hinder their ability to effectively plan and utilize their properties.

Resolution: The meeting reached a consensus that the sewer line should be rerouted to follow the road reserve, ensuring sufficient space for landowners.

Action Items:

- Mr. Mwenda (TWWDA) confirmed that the rerouting has been completed.
- The consultant team will assess and verify the impact of the rerouting on the project.

MIN 5/03/2024: CLOSING REMARKS

The Principal Legal Officer, Lilian Kamau, thanked the PAPs for being receptive to the consultant. She assured the participants that the process would be above board and that any grievances would be adequately addressed.

Mr. Mwenda also assured that all the issues raised in the meeting shall be addressed immediately and effectively. He assured the PAPs that he would visit the ground the following day together with the consultant to determine possibilities of realignment. He also requested the continued cooperation of the PAPs.

Consultant Response: The consultant team leader assured the community that their concerns and requests would be thoroughly reviewed and addressed in the project recommendations.

Area Chief's Perspective: The Area Chief commended the project's potential to improve community health and well-being, offering insights based on local needs. He expressed gratitude for the community's participation and feedback.

Adjournment: With no further business, the Area Chief adjourned the meeting at 4:30 PM with a closing prayer.

MINUTES CERTIFICATION

Consultant:	**NDAGANI AREA CHIEF (THE PUBLIC ADMINISTRATION)** Mr. Charles Njagi

Minute of Public Participation

MINUTES CERTIFICATION

Consultant: Augustus Anyumbo	**CHUK AREA CHIEF (THE PUBLIC ADMINISTRATION)** Mr. Charles Njagi
DATE: 26/3/2024	**DATE:** 26/3/2024
SIGNATURE:	**SIGNATURE:** **Stamp** CHIEF KARINGANI LOC. BOX 80 CHUKA. 26/3/24 Njagi

CONFIRMED BY:

TWWDA REPRESENTATIVE
Gregory Mwenda 25th March 2024 Sign.....

Public Participation Attendance List

Date ..... Time ..... Venue .....

No.	Name	Location	ID No.	Contacts	Signature
1.	William Kenoi	Kariganí	11191236	0710078187	
2	MORRIS MUIWIRI	//	26772531	0705740306	
3	Josphine Mulei	//	24937506	0703873712	
4	Stella Kanana	//	31317977	0705049845	
5	Fridah Katuni	//	26584833	0713888639	
6	Augustus Onyimbo	Consultant	23521030	0722755959	
7	Gregory Musonda	TWWDA	31341831	0740780565	
8	WILIAN GITAITI	TWWDA	32369515	0741736779	
9.	Liliane Kamau	TWWDA	[illegible]	0721783176	
10	Griffins Musungu	Consultant	35636221	0790312018	
11.					
12.					

Public Participation Attendance List

Date: ..... Time: ..... Venue: .....

No.	Name ~~William Kendi~~	Location ~~Katigani~~	ID No. ~~11191236~~	Contacts ~~0710078187~~	Signature ~~KR~~
1.	William Kendi	Katigani	11191236	0710078187	KR
2.	MORRIS MUIMIRI	//	26772531	0705740306	MM
3.	Josphine Mulei	//	24937506	0703873792	
4.	Stella Karanu	//	31317977	0705049845	
5.	Fridah Katuni	//	26584833	0713888 39	Catuni
6.	Augustus Onyimbo	Consultant	23521030	0722755959	
7.	Gregory Mwenda	TWWDA	31341831	0720780565	
8.	NILIAN GITAITI	TWWDA	32369515	0741736779	
9.	Liziane Kemau	TWWDA	~~27054441~~	0721783176	
10.	Griffins Muungu	Consultant	35636223	0790312018	
11.					
12.					

TANA WATER WORKS DEVELOPMENT AGENCY

THE PUBLIC PARTICIPATION MINUTES FOR LAST MILE CONNECTIVITY OF THE CHUKA SEWERAGE PROJECT HELD ON 14TH, FEBRUARY 2024 AT DAGANI SOCIAL HALL IN THARAKA NITHI COUNTY AT 12OO HRS

MEMBERS PRESENT

Attendance List Attached

AGENDA

The agenda of the meeting was as follows:

- Preliminary matter
- Introduction and Presentation of the sewerage project to the community
- Comments and Concerns of the Community
- Closing remarks

MIN 1/14/02/2024: PRELIMINARY MATTER

The area chief Mr Njagi called the meeting to order promptly at noon which began with a word of prayer from one of the community members and thereafter a welcoming note to the participants and the Tana Water Works Development Agency and Environmental consultants' team.

Further, he gave a brief on the current state of their sewerage project and urged the community to participate. Additionally, he encouraged community members to provide feedback regarding the project, emphasizing the need to seek clarification where possible.

MIN 2/14/02/2024: INTRODUCTION AND PRESENTATION OF THE PROJECT

Mr. Mwenda who represented TWWDA provided an overview of the project while citing their major accomplishments. He further highlighted that he was collaborating with relevant stakeholders to ensure successful completion and further handing over when completion is done. He also stressed the importance of meeting the community's water and sewer needs while ensuring the infrastructure's long-term sustainability. Additionally, he emphasized the importance of a collaborative approach, working closely with local authorities and communities to address any challenges that may arise during the project.

He later engaged the community in discussions that clarified the project activities in their areas. Thereafter, he welcomed the consultant team leader Mr Mutuma for more technical information on the project.

Mr Mutuma emphasized the paramount importance of conducting a thorough environmental and social impact assessment. Highlighting potential risks and benefits, the consultant stressed the need for a balanced approach that preserves the local ecosystem while addressing the community's water and sanitation needs. He also underlined the significance of community involvement in decision-making processes and the implementation of environmentally friendly practices throughout the project.

MIN 3/14/02/2024: COMMENTS AND CONCERNS OF THE COMMUNITY

NAME OF THE CONCERNED MEMBER	QUESTION ASKED	RESPONSE FROM THE TECHNICAL TEAM
Justin Kiruja	He has two commercial properties in Chuka and Chogoria towns and needed clarification on whether he would benefit from the project as the exhauster services were very expensive	The areas where his properties were situated were part of the sewerage network and therefore he would be a beneficiary of the proposed sewer LMC.
Catherine Mutembei	She needed more clarification on how the RAP will be done on selected households	Notification will be done through the chief and other relevant officials at the start of the process

MIN 4/15/02/2024: CLOSING REMARKS

The team leader of the consultants assured the community that their grievances and wishes would be carefully considered and incorporated into the project's recommendations.

The chief of the local community provided valuable insights grounded in the community's perspectives and needs. Expressing gratitude for the initiative, the chief highlighted the potential positive impacts on the community's health and overall well-being. He also stressed the importance of clear and continuous communication between project stakeholders and the community to address any concerns or questions. Additionally, the chief requested that cultural

and local considerations be taken into account to ensure the project aligns with the community's values and practices. Thereafter, the chief thanked the participants for their participation and feedback giving a few remarks before concluding the meeting.

There being no other business the meeting was adjourned with a closing prayer at 1400 hrs.

MINUTES CERTIFICATION

LEAD EXPERT: Reg. No 7394
Bernadett Wairimu Njoroge

DATE: 11/3/2024

SIGNATURE:

NDAGANI CHIEF
Mr. Charles Njagi

CHIEF
KARINGANI LOC
BOX 80 CHUK

DATE: 25/3/2024

SIGNATURE:

CONFIRMED BY:

LEAD EXPERT	THE PUBLIC ADMINISTRATION
Eng. Bernadett Wairimu NEMA Reg No. 7394 11th, March 2024 Sign.....	DCC CHUKA SUB COUNTY Name: ..... Date 12th March 2024 Sign .....

THE NATIONAL URBAN WATER SUPPLY AND SANITATION PROGRAM)
SITE SPECIFIC STUDIES, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT(ESIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR PROJECTS IN THARAKA NITHI COUNTY

PROJECT: PROPOSED LAST MILE CONNECTIVITY OF CHUKA SEWERAGE PROJECT

PUBLIC PARTICIPATION LIST

VENUE Water office Chuka **DATE** 15/02/2024 **TIME** 9.00AM.

S/ No.	NAME	VILLAGE/INSTITUTION	ID No	CONTACTS	SIGN
1	Japhet Nyaga Mbaka	Kibumbu	12731562	0726825579	
2.	Stella Waluda Maura	Kibumbu	23767770	0716233057	
3	Harrison Mwithi	Kibumbu	11695604	0720536834	
4	ELIAS KIMVA MAGA	KIBUMBU	13262915	0726749122	
5	DONARD NYAGA KAROMBO	KIBUMBU	4321870	0710808757	
16	CHARLES MUIEMBE BUNDI	KIBUMBU	20687742	0791789472	
7	DEDAN KIMANTHI JOSEPH	〃	11156114	0721300534	
8	JOHNSON MUIGAMBI	〃			
9	ELIBETAT MUKUBU MUEKI		17395/6 1735986	0727989340	
10	Joel Mwangi	Kibumbu	22196957	0721568488	
11	ANNE NDUTA ICINYUA	Kibumbu	26000918	0702937534	

OFFICE OF THE ASSISTANT CHIEF
CHUKA TOWNSHIP
P. O. Box 80 - 60400, CHUKA
Date: 15/2/2024

THE NATIONAL URBAN WATER SUPPLY AND SANITATION PROGRAM)
SITE SPECIFIC STUDIES, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT(ESIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR PROJECTS IN THARAKA NITHI COUNTY

PROJECT: PROPOSED LAST MILE CONNECTIVITY OF CHUKA SEWERAGE PROJECT

PUBLIC PARTICIPATION LIST

VENUE ..... Water Office (Chuka) ..... DATE ..... 15/02/2024 ..... TIME ..... 9:00AM .....

S/ No.	NAME	VILLAGE/INSTITUTION	ID No	CONTACTS	SIGN
12	VELICE K MBUANI	KIBUMBU	4220395	0716130053	
13	SARTY KARI MBUANI	KIBUMBU	1728226		Ikuani
14	CATHERINE GATUNE	KIBUMBU			CG.
15	ELICAH MUNYORA	KIBUMBU	4446908	0714427691	Elicah
16	ELIJAH MURUGI	KIBUMBU	13353585	0722336812	EM
17	CECILIA KAGENDO	KIBUMBU	28240644	0711303214	Kag
18	NADO GITONGA	KUNYUNGU	11894177	0796761242	Nbbo
19	Justin Kiruja Mabuni	Chuka Town	720920	0722336883	

OFFICE OF THE ASSISTANT CHIEF
CHUKA TOWNSHIP
P. O. Box 80 - 60400, CHUKA
Date: 15/2/2024

THE NATIONAL URBAN WATER SUPPLY AND SANITATION PROGRAM)
SITE SPECIFIC STUDIES, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT(ESIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR PROJECTS IN THARAKA NITHI COUNTY

PROJECT: PROPOSED LAST MILE CONNECTIVITY OF CHUKA SEWERAGE and water supply PROJECT

PUBLIC PARTICIPATION LIST

VENUE ..Ndagani chiefs Office.. DATE..14/02/2024.. TIME ..12:55 PM..

S/ No.	NAME	VILLAGE/INSTITUTION	ID No	CONTACTS	SIGN
1	GEORGE OGARO	KISHUSWA/Slaughter	24697761	0722131476	
2	Margret Mwiru	Gichucha	2463311	0716411591	
3.	Fridah Njagi	Gichucha.	20242965	0720766243	
4.	JOSEPH KIVUNJA	NDOGO Village	26422105	0710486679	
5	ESTHER KAWIRA	NDOGO Village	14618335	0721685423	
6	JUSTIN KIRUJA	Juverus City	7209120	0722336883	
7	EUNICE KINOTI	SLAUGHTER		0722915353	
8.	Betty KWANA	Doctors PLAZA GICHUCHA	25843852	0718442613	
9	Nimrod Mutagaro	Kishuswa	32864816	0799245174	
10	REV. ARMSTRONG N. NJERU	NDAGANI MKT & RUKINDU VILLAGE	50863443	0721 327802 0733 788448	
11	Catherine Muthembé	Gichucha	10795294	0726056380	

THE NATIONAL URBAN WATER SUPPLY AND SANITATION PROGRAM)
SITE SPECIFIC STUDIES, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT(ESIA) AND RESETTLEMENT ACTION PLAN (RAP) FOR PROJECTS IN THARAKA NITHI COUNTY

PROJECT: PROPOSED LAST MILE CONNECTIVITY OF CHUKA WATER SUPPLY and sewerage PROJECT

PUBLIC PARTICIPATION LIST

VENUE: Ndagani Chief's Office DATE: 14/02/2024 TIME: 12:00PM.

S/ No.	NAME	VILLAGE/INSTITUTION	ID No	CONTACTS	SIGN
12	CAROLYNE WANJA NJERU	SLAUGHER	22106514	0728449708	[signature]
13	MARY CIAMBAKA	NDAGANI		0721828989	[signature]
14	NJAGI CHARLES	NGAO Chief	12614398	0724288012	[signature]
15	JANE MUHARI	NDAGANI	7029873	0721333973	[signature]

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

Proposed Last Mile Connectivity of Chuka Sewerage Project

Tana Water Works Development Agency (TWWDA) is one of the nine (9) water Agencies under the Ministry of Water, Sanitation and Irrigation which is supporting the government in developing, maintaining, and managing national public water works to attain sustainable access to quality water and improved sewerage services within its area of jurisdiction. As part of its strategic plan, TWWDA is committed to increase the water and sewerage coverage in its area of jurisdiction from 57.8% and 8.1% in 2023 to 90% and 30% by 2027 respectively through development of sustainable Water and Sanitation Infrastructure

TWWDA has identified various water and sewerage projects within its area of jurisdiction to be undertaken under the National Urban Water Supply and Sanitation Program (NUWaSSaP) and have engaged the services of a consultant to undertake review and site-specific studies, Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for implementation of the above proposed project. The implementation of the project is to be funded by the African Development Bank (AfDB) and the Government of Kenya (GoK). As a prerequisite for project funding and subsequent implementation, ESIA and RAP studies have to be undertaken and the reports approved.

As a member of the local community / surrounding enterprise / interested party, we request your comments on the expected socio-economic and environmental impacts of the proposed project. As a requirement of the AFDB Integrated Safeguards System, the Environmental Management and Co-ordination Act (1999), the Environmental (Impact Assessment and Audit) Regulations (2003) revised in 2015, Relevant Environmental and Social Policies, Public Health Act and Legal Supplement 2003, on environmental impact assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

(Please note that these details are required for the purposes of authenticity in relation to the proposed project)

a) What is the distance between your house/enterprise and the project site? (*Tick where applicable*)

Less than 100m ☐ 100 – 500m ☑ 501 -1000m ☐ Over 1Km ☐

b) Are you familiar with the activities that would be involved in the Proposed Project?

Yes ☑ No ☐

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes ☑ No ☐

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes ☑ No ☐

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

.....Employment.....
.....Development within the area.....
.....
.....
.....

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

Soil erosion during operations

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

Inform the public before starting the project.
give jobs to residents.

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

NO

Name: ERICK MWENDA Date: 16/2/2024

Designation / Residence: Asst. Chief

Contact 0726895613

Signature

OFFICE OF THE ASSISTANT CHIEF
CHUKA TOWNSHIP
P. O. Box 80 - 60400, CHUKA
Date:

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

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b) Are you familiar with the activities that would be involved in the Proposed Project?

Yes ☑ No ☐

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes ☑ No ☐

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes ☑ No ☐

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

.....Employment.....
.....
.....
.....
.....

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

Noise pollution

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

Employment of Local youths.

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

NO

Name: Benson Ndeke Mistheck Date: 15/02/2024

Designation / Residence: Area Manager

Contact: 0727551277

Signature:

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

Proposed Last Mile Connectivity of Chuka Sewerage Project

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b) Are you familiar with the activities that would be involved in the Proposed Project?

Yes ☑ No ☐

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes ☑ No ☐

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes ☑ No ☐

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

The construction will be of Positive because the Project will help to Maintain good environment.

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

The Negative Side and environment is that some individual have small piece of land which will effect & some individuals to losse their homestead, But because it will be compensation it will be okay to them.

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

It is of great concern that the developer should construct on the line by deverting to where there is view structures

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

The Proposed Project is good and so it should be done as as the residence as agreed

Name: David Ngaga Date: 15/02/2024

Designation / Residence: KiBumBy

Contact: 0710808757

Signature: [signature]

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

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b) Are you familiar with the activities that would be involved in the Proposed Project?

Yes ☑ No ☐

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes ☑ No ☐

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes ☑ No ☐

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

~~Atonte~~ Promotion of job opportunities to the youth

Promotion of Health

CHIEF
KARINGANI LOCATION
DATE..22/3/2024

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

None

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

- Relocate areas that as less building
Sensitizating to all members in order for them to own it.
- Repairing or paying the damaged properties of resident.

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

- Let all resident be involved well doing the [illegible]

Name: Njagi Charles Date: 22/3/2023

Designation / Residence: Ndagani

Contact: 0724287417

Signature: [signature]

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

Proposed Last Mile Connectivity of Chuka Sewerage Project

Tana Water Works Development Agency (TWWDA) is one of the nine (9) water Agencies under the Ministry of Water, Sanitation and Irrigation which is supporting the government in developing, maintaining, and managing national public water works to attain sustainable access to quality water and improved sewerage services within its area of jurisdiction. As part of its strategic plan, TWWDA is committed to increase the water and sewerage coverage in its area of jurisdiction from 57.8% and 8.1% in 2023 to 90% and 30% by 2027 respectively through development of sustainable Water and Sanitation Infrastructure

TWWDA has identified various water and sewerage projects within its area of jurisdiction to be undertaken under the National Urban Water Supply and Sanitation Program (NUWaSSaP) and have engaged the services of a consultant to undertake review and site-specific studies, Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for implementation of the above proposed project. The implementation of the project is to be funded by the African Development Bank (AfDB) and the Government of Kenya (GoK). As a prerequisite for project funding and subsequent implementation, ESIA and RAP studies have to be undertaken and the reports approved.

As a member of the local community / surrounding enterprise / interested party, we request your comments on the expected socio-economic and environmental impacts of the proposed project. As a requirement of the AFDB Integrated Safeguards System, the Environmental Management and Co-ordination Act (1999), the Environmental (Impact Assessment and Audit) Regulations (2003) revised in 2015, Relevant Environmental and Social Policies, Public Health Act and Legal Supplement 2003, on environmental impact assessment, public participation is an important exercise for achieving the fundamental principles of sustainable development.

(Please note that these details are required for the purposes of authenticity in relation to the proposed project)

a) What is the distance between your house/enterprise and the project site? (*Tick where applicable*)

Less than 100m ☐ 100 – 500m ☑ 501 -1000m ☐ Over 1Km ☐

b) Are you familiar with the activities that would be involved in the Proposed Project?

Yes ☑ No ☐

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes ☑ No ☐

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes ☑ No ☐

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

This will enhance cleanness and sanitation of the town

Office Of The President
THE CHIEF
CHOGORIA LOCATION

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

May closing of roads and diversion which may not have alot of disturbance as it is short time

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

The project should try to capture larger area possible as the urban centre is growing.

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

The project is okay and will assist the town.

Name: John Nyonge Date: 22/3/2024

Designation / Residence: Resident.

Contact: 0723513629

Signature:

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

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Yes [✓] No [ ]

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Yes [✓] No [ ]

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes [✓] No [ ]

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

NO EFFECT

Office Of The President
THE CHIEF
CHOGORIA LOCATION

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

No Negative

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

Involve Locals Expertise

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

Be friendly to Residents

Name: JANE KAKUBA Date: 22/3/2021

Designation / Residence: CHOGORIA

Contact: 0716142044

Signature: JKB

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

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Yes [✓] No [ ]

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Yes [✓] No [ ]

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes [✓] No [ ]

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

.....

.....

.....No Negativity.....

.....

.....

Office Of The President
THE CHIEF
CHOGORIA LOCATION

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

No Negative

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

Involvement of locals

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

Employment of locals

Name: John Gitonga Date: 22/3/2024

Designation / Residence: Chokoret

Contact: 0721395360

Signature:

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

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Yes [✓] No [ ]

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Yes [✓] No [ ]

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes [✓] No [ ]

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

.....

.....

.....No Negativity.....

.....

.....

Office Of The President
THE CHIEF
CHOGORIA LOCATION

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

No Negativity

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

involvement of local experties for construction

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

involving locals to own the project

Name: Ehud Makiku Date: .....

Designation / Residence: CHOGORIA

Contact: 0720677081

Signature: .....

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

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Yes [✓] No [ ]

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes [✓] No [ ]

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes [✓] No [ ]

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

.....CLEAN ENVIRONMENT.....
.....
.....
.....
.....

Office Of The President
THE CHIEF
CHOGORIA LOCATION

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

.....
.....NO Negative.....
.....
.....
.....
.....
.....

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

.....
.....
.....Sealing up Manholes.....
.....
.....
.....
.....

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

.....
.....Vaccinating / peoples awareness.....
.....
.....Youth Employment.....
.....V. High Charges.....
.....
.....

Name: JENIFFER KENDI Date: 22/3/2024

Designation / Residence: CITOGORIA

Contact: 0729810402

Signature: .....

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

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b) Are you familiar with the activities that would be involved in the Proposed Project?

Yes ☑ No ☐

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes ☐ No ☑

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes ☑ No ☐

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

It will improve Sanitation in the Community

CHIEF
KARINGANI LOCATION
DATE. 22/3/2024

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

NONE

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

We request you do consider employing residence from the area.

Name: WINCATE Date: 22/03/2024

Designation / Residence: KATHIGIRIRI

Contact: 0790955044

Signature: Wate

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

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Yes ☑ No ☐

c) Do you think you and your enterprise will be affected by the above proposed project?

Yes ☑ No ☐

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes ☑ No ☐

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

.....Employment.....
.....Development within the areas.....
.....
.....
.....

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

Soil erosion during operations

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

Inform the public before starting the project.
give jobs to residents

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

NO

Name: ERICK MUTENDA Date: 15/2/2024

Designation / Residence: Asst. Chief

Contact 0726855615

Signature

OFFICE OF THE ASSISTANT CHIEF
CHUKA TOWNSHIP
P. O. Box 80 - 60400, CHUKA
Date:

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

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c) Do you think you and your enterprise will be affected by the above proposed project?

Yes ☑ No ☐

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes ☑ No ☐

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

The construction will be of Positive because the project will help to Maintain good environment.

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

The Negative Side and environment is that some individual have small piece of land which will effect to some individuals to lose their lands, But because it will be compensation it will be okay to them.

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

It is of great concern that the developer should construct on the line by leaving to where there is new structures

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

The Proposed Project is good and so it should be done as the residents agreed

Name: David Ngaga Date: 15/02/2024

Designation / Residence: KiBumBy

Contact: 0710808757

Signature:

THANK YOU FOR YOUR RESPONSE

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) QUESTIONNAIRE FOR LOCAL COMMUNITY MEMBERS/ SORROUNDING ENTERPRISES/INTERESTED PARTIES

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Yes ☑ No ☐

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Yes ☑ No ☐

d) Do you think this proposed project is suitable and compatible with the surrounding developments?

Yes ☑ No ☐

e) What **POSITIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project:

.....Employment.....
.....
.....
.....
.....

f) What **NEGATIVE** socio-economic and environmental impacts do you anticipate during the construction and operation stages of the project?

Noise pollution

g) Make suggestions on the measures that the developer needs to put in place during the construction/setting up and operation stages.

Employment of Local youths.

h) Any other **comments/suggestions** you would like to make in relation to the proposed project activities?

NO

Name: Benson Ndeke Mishedi Date: 15/02/2024

Designation / Residence: Area Manager

Contact 0727551277

Signature

THANK YOU FOR YOUR RESPONSE

EIA2306280 3

nema
Mazingira Yetu | Uhai Wetu | Wajibu Wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

CERTIFICATE OF VARIATION OF ENVIRONMENTAL IMPACT ASSESSMENT LICENSE

Certificate No: **NEMA/EIA/VC/2185**

Application Reference No: **NEMA/EIA/VEIA/3527**

This is to certify that the Environmental Impact Assessment License No **NEMA/EIA/PSL/8177** issued on 7/8/2019

to **Tana Water Services Board.**

of

P.O.Box 1912- 10100, Nyeri.

regarding

Proposed Chuka and Chogoria Water Supply & Sewerage Project.

whose objective is

Construction and supervision of Chuka Town public sewerage system comprising secondary sewers, trunk sewers, sewrage treatment plant, associated facilities and amenities.

located at

Chuka Township in Tharaka Nithi County.

has been varied to

Extend the EIA License validity period by an additional twenty four (24) months to allow completion of the project, subject to conditions on EIA License No. NEMA/EIA/PSL/8177 and the additional condition overleaf.

with effect from **03 May, 2024** in accordance with the provisions of the Act.

Date: **03 May, 2024**

Signature

(Seal)

Director-General
The National Environment Management Authority.

P.T.O.

ISO 9001 : 2015 Certified

1. The proponent shall **undertake annual Environmental Audit (EA)** to ascertain the efficacy of the impacts mitigation measures proposed in the Environmental and Social Management Plan (ESMP) and report compliance to the Authority by submitting the EA report within the first year of commencement/commissioning as stipulated in the EIA License and Section 68 (3) & (4) of EMCA, 1999 and Regulations 31 of the EIA/EA Regulations, 2003.

nema

mazingira yetu | uhai wetu | wajibu wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESMENT LICENSE

License No: NEMA/EIA/PSL/8177

Application Reference No: NEMA/EIA/SR/1281

This is to certify that the Environmental Impact Assessment Study Report received from

Tana Water Services Board.

P. O. Box 1912 - 10100, Nyeri.

submitted to the National Environment Management Authority in accordance with the Environmental Impact Assessment & Audit Regulations, 2003 regarding the:

Proposed Chuka and Chogoria Water Supply and Sewerage Project.

whose objective is to carry on

Construction and supervision of Chuka Town public sewerage system comprising secondary sewers, trunk sewers, sewerage treatment plant, associated facilities and amenities.

located at

Chuka Township in Tharaka Nithi County.

has been reviewed and a license is hereby issued for the impiementation of the project, subject to attached conditions.

Issue Date : **08 July, 2019**

Signature

(Seal)

Director-General
The National Environment
Management Authority.

P.T.O.

ISO 9001 BUREAU VERITAS Certification

ISO 9001: 2008 Certified

1.0 General Conditions

1.1 This project is for the construction supervision of Chuka Town Public sewerage system comprising secondary sewers, trunk sewers, sewerage treatment plant and associated facilities in Chuka Township, Tharaka Nithi County.

1.2 The license shall be valid for 24 months (time within which the project shall commence) from the date hereof.

1.3 The Director General shall be notified of any transfer, variation or surrender of this license.

1.4 The proponent shall provide the final project accounts (final project costs) on completion of construction phase. This should be done prior to project commissioning/operation/occupation.

1.5 Without prejudice to the other conditions of this license, the proponent shall implement and maintain an environmental management system, organizational structure and allocate resources that are sufficient to achieve compliance with the requirements and conditions of this license.

1.6 The Authority shall take appropriate action against the proponent in the event of breach of any of the conditions stated herein or any contravention to the Environmental Management and Co- ordination Act, Cap 387 and regulations there-under.

1.7 This license shall not be taken as statutory defense against charges of pollution in respect of any manner of pollution not specified herein.

1.8 The proponent shall ensure that records on conditions of licenses/approval and project monitoring and evaluation shall be kept on the project site for inspection by NEMA's Environmental Inspectors.

1.9 The proponent shall submit an Environmental Audit Report in the first year of occupation/operation/commissioning to confirm the efficacy and adequacy of the Environmental Management Plan.

1.10 The proponent shall comply with NEMA's improvement orders throughout the project cycle

2.0 Construction Conditions

2.1 The proponent shall obtain the requisite approvals from the County Government of Tharaka Nithi and all other relevant Authorities prior to commencement of works.

2.2 In the event that the project borders a river or a stream, the proponent, Pursuant to regulation 6 (c) of the Water Quality Regulations 2006, shall protect the riparian by ensuring that **NO** development activity is undertaken within the full width of the river or stream to a minimum of six (6) metres and a maximum of 30 metres on either sides based on the highest recorded flood levels.

2.3 The proponent shall ensure that the construction is done as per the approved drawings in adherence to the Building code 1968, and the provisions of the National Construction Act, 2011.

2.4 The proponent shall ensure relocation, compensation and restoration of livelihoods for any project affected persons (PAPs) and develop a consultative plan for emerging issues and grievance redress mechanisms (GRM) as shall be prescribed in the Resettlement Action Plan (RAP).

2.5 The proponent shall design and implement a concise traffic management plan duly approved by the County Engineer and other relevant Authorities before commencement of works.

2.6 The proponent shall ensure that the storm drainage channels do not directly discharge of untreated waste water and any other debris into the nearby stream.

2.7 The proponent shall put up a project signboard as per the Ministry of Transport and Infrastructure Standards indicating the NEMA licence number among other information.

2.8 The proponent shall ensure air pollution control measures are put in place to mitigate against dust during the construction phase.

2.9 The proponent shall ensure that all excavated material and debris is collected, re-used and where need be disposed off as per the Environmental Management Coordination Management (Waste Management) Regulation 2006.

2.10 The proponent shall ensure strict adherence to the provisions of the Environmental Management and Coordination (Noise and Excessive Vibrations Pollution Control) Regulations of 2009.

2.11 The proponent shall ensure strict adherence to the Occupational Safety and Health Act (OSHA), 2007.

2.12 The proponent shall ensure strict adherence to the provisions of the Environmental Management and Coordination (Air Quality) Regulations of 2014.

2.13 The proponent shall ensure that construction workers are provided with adequate personal protection equipment (PPE), sanitary facilities as well as adequate training.

2.14 The proponent shall ensure that construction activities are undertaken during the day (and not at night) between 0800 hrs and 1800 hrs and on Saturdays between 0800hrs and on Saturdays between 0800hrs and 1300hrs and shall ensure that transportation of construction material to and from the site are undertaken during weekdays and Saturdays only during the hours specified herein.

2.15 The proponent shall ensure the project will not encroach on any way-leave and road reserves.

2.16 The proponent shall ensure that the cooling systems employed are suitable alternatives with zero ozone depleting potential as per Environmental Management and Coordination (Controlled Substances) Regulations, 2007.

2.17 The proponent shall ensure that the development adheres to zoning specification issued for the development of such a project within the jurisdiction of the Tharaka Nithi County Government with emphasis on the approved land use for the area.

2.18 The proponent shall ensure strict adherence to the Environmental Management Plan developed throughout the project cycle.

3. Operational Conditions

3.1 The proponent shall ensure that all waste water is disposed of as per the standards set out in the Environmental Management and Coordination (Water Quality) Regulations, 2006.

3.2 The proponent shall obtain an effluent discharge licence from NEMA for the proposed leachate treatment plant within first year of operation.

3.3 The proponent shall ensure that all drainage facilities are fitted with adequate functional oil water separators and silt traps.

3.4 The proponent shall ensure that appropriate and functional efficient air pollution control mechanisms are installed in the facility to control all air emissions.

3.5 The proponent shall ensure compliance with the provisions of the Energy (Solar Water Heating) Regulations, 2012.

3.6 The proponent shall ensure that all equipments used are well maintained in accordance with the Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009.

3.7 The proponent shall ensure that all solid waste is handled in accordance with the Environmental Management and Coordination (Waste Management) Regulations, 2006.

3.8 The proponent shall comply with the relevant principal laws, by-laws and guidelines issued for development of such a project within the jurisdiction of the Tharaka Nithi County Government, Ministry of Lands, Housing and Urban Development, Ministry of Health, Kenya Urban Roads Authority, National Construction Authority, Directorate of Occupational Health and Safety Services, Water Resources Management Authority, Tharaka Nithi Water and Sewerage Company and other relevant Authorities.

3.9 The proponent shall ensure that environmental protection facilities or measures to prevent pollution and ecological deterioration such as functional landscaping and tree-planting, dust control measures, traffic management plan, functional storm drainage system, solid waste management plan, waste water management plan, fire control plan, a material recovery plan, security management plan, soil erosion control and noise abatement mechanisms are designed, constructed and employed simultaneously with the proposed project.

4. **Notification Conditions**

4.1 The proponent shall seek written approval from the Authority for any operational changes under this license.

4.2 The proponent shall ensure that the Authority is notified of any malfunction of any system within 12 hours on the NEMA hotline No. **020 6006041** and mitigation measures put in place.

4.3 The proponent shall keep records of all pollution incidences and notify the Authority within 24 hours.

4.4 The proponent shall notify the Authority of its intent to decommission three months in advance in writing.

5. Decommissioning Conditions

5.1 The proponent shall ensure that a decommissioning plan is submitted to the Authority for approval at least three (3) months prior to decommissioning.

5.2 The proponent shall ensure that all pollutants and polluted material is contained and adequate mitigation measures provided during the phase.

The above conditions will ensure environmentally sustainable development and must be complied with.