Government of Kenya

Tana Water Works Development Agency (TWWDA)

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

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CERTIFICATION

For and on behalf of:
TWWDA

This Environmental and Social Impact Assessment (ESIA) Summary Project 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 for Chuka Water Supply Project in Chuka, Tharaka Nithi County.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACC	Assistant County Commissioner
BoQ	Bill of Quantities
DCC	Deputy County Commissioner
EA	Environmental Audit
EIA	Environmental Impact Assessment
EMCA	Environmental Management Coordination Act
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Management and Monitoring Plan
ESMP	Environmental and Social Management Plan
GBV	Gender Based Violence
GDP	Gross Domestic Product
GI	Galvanised Iron
GoK	Government of Kenya
GRP	Glass Reinforced Plastic
GRM	Grievance Redress Mechanism
Ha	Hectares
HDPE	High-Density Polyethylene
HIV/ AIDs	Human Immunodeficiency Virus/ Acquired Immuno Deficiency Syndrome
IBA	Important Bird Area
KENHA	Kenya Highways Highway Authority
KERRA	Kenya Rural Roads Authority
KURA	Kenya Urban Roads Authority
KTSWSSP	Kenya Towns Sustainable Water Supply and Sanitation Program
LMC	Last Mile Connectivity
M asl	Metres Above Sea Level
MDAs	Ministries, Departments and Agencies
MEAs	Multilateral Environmental Agreements
MTPs	Medium Term Plans
NEAP	National Environmental Action Plan
NEMA	National Environmental Management Authority
NGO	Non-Governmental Organisation
NIWASCO	Nithi Water and Sanitation Company
NPS	Nominal Pipe Size
OD	Outside Diameter
OHS	Occupational Health and Safety
PAP	Project Affected Persons(s)
PCU	Project Coordination Unit
PVC	Polymerizing Vinyl Chloride / Polyvinyl Chloride
PVC-O	Oriented PVC
RAP	Resettlement Action Plan

RE	Residential Engineer
SEA	Sexual Exploitation and Abuse
STDs	Sexually Transmitted Diseases
ToR	Terms of Reference
TWWDA	Tana Water Works Development Agency
UNFCCC	United Nations Framework Convention on Climate Change
UPVC	Unplasticized Polyvinyl Chloride
WASREB	Water Services Regulatory Board
WRA	Water Resources Authority
WSP	Water Service Provider
WSTF	Water Sector Trust Fund

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EXECUTIVE SUMMARY

Overview of the Project

The Chuka Water Supply Project was designed into two phases, where phase one covered work done from the intake to the treatment plant and to the storage tanks and a mainline to the beneficiary community. This phase did not cover the connectivity network from the main line through the submain lines to the beneficiary communities. To ensure last mile connection, Phase two of the project was proposed to ensure there is a good distribution system that can adequately serve the proposed beneficiaries once the project is handed over to the local Water Service Provider (WSP).

Project Location

The proposed Project is located in Chuka and Igamba ng'ombe sub counties in Tharaka Nithi County, which is part of Kenya's wider central region. The county has 5 sub counties namely: Tharaka North, Tharaka South, Chuka, Igambang'ombe and Maara. Chuka town is on the eastern slopes of Mount Kenya, about 65 km south of Meru Town. The project area is located at Rubate market, Itugururu market and their environs. Below is a layout of the project area.

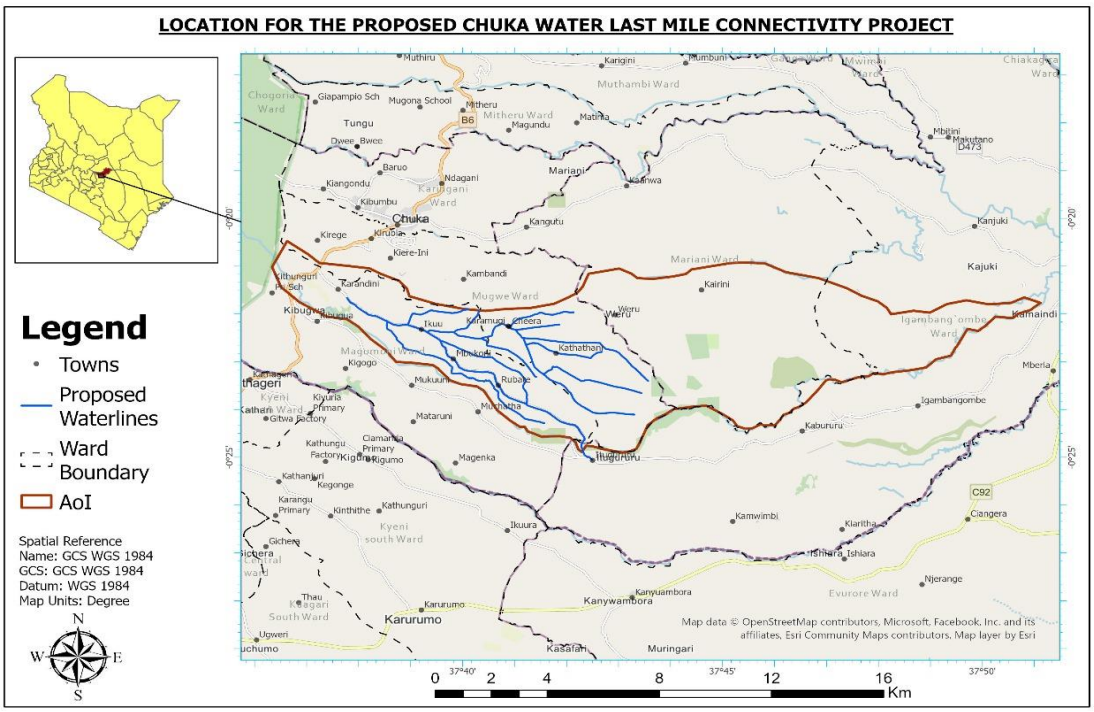

Figure 1: Project area layout

Project Activities

Table 1: Summary of Project Activities

Project Phase	Main Activities
Planning Phase	Resource mobilization, tendering services, site hand over, handover of project drawings and site layout to the contractor
Construction Phase	Excavation will be required to expose the ground where the water supply lines and auxiliary infrastructure will be installed. This will typically be done using excavators and backhoes in conjunction with human labour as per the approved designs. Pipe Installation: The pipes will be laid in place accordance to the planned layout and the proposed designs. Jointing and Connection: Pipes will be joined together using appropriate fittings and connectors. This will involve techniques such as solvent welding for PVC pipes, heat fusion for HDPE pipes, soldering for copper pipes, or threading for steel pipes. Valves, hydrants, and other components will also be installed as required. Backfilling: the excavated trench will be backfilled with soil. Pressure Testing: the newly installed water supply lines will be pressure tested to ensure there are no leaks. This will involve pressurizing the system to a specified pressure and monitoring it for a period of time to verify that the pressure remains stable. Connection to Water Source: the water supply lines will be connected to the source of water, from the water mains within the existing system.
Operation Phase	Upon completion, the project shall provide a reliable and clean water source for domestic consumption. The management and operation of the system will be entrusted to the local Water Service Provider, Nithi Water and Sanitation Company (NIWASCO), in accordance with the provisions of the Water Act 2016 and the policies set forth by WASREB. Active monitoring will be carried out to ensure compliance with local, national, and international environmental sustainability standards and best practices. Regular assessments will be conducted to ensure that the Project maintains the necessary standards and effectively fulfils its intended role
Decommissioning	The decommissioning activities will involve demolition of the affected structures. Non-reusable materials from the demolition process will be sold to licensed scrap metal dealers. The affected land will undergo restoration which will involve activities such as tree planting

Analysis of Project Alternatives

The Environmental and Social Impact Assessment comprehensively explored various alternatives for the project, including the "No Action" alternative, which entails maintaining the current water supply situation in Chuka and the alternative materials for the piping systems. However, opting for the "No Action" alternative was deemed unsuitable as it would perpetuate the existing challenges faced by residents in regards to water and sanitation, leading to continued reliance on unsafe water sources and enduring water-related illnesses. Additionally, it would result in under-utilization of previous project investments made in the first phase.

In terms of piping materials, the selection of HDPE for underground piping with a mix steel pipe for above the ground pipes was considered the most suitable option based on their advantages, particularly HDPE's sustainability benefits. This choice was made after careful consideration of alternative materials, ensuring that the pipeline design aligns with the long-term objectives of the Last Mile Connectivity of the Chuka water supply project.

The proposed project was found to have minimal impacts on sensitive ecosystems and does not impede any future plans for Chuka town and its environs. Therefore, implementing the project as outlined in the ESIA and design was deemed the most appropriate approach, especially with the integration of ESIA recommendations.

Brief Description of the Project Site and major Environmental and Social Stakes

The proposed Project is located in Chuka and Igamba ng'ombe sub counties in Tharaka Nithi County, which is part of Kenya's wider central region. Specifically, the project area is located at Rubate market, Itugururu market and their environs. The main road passing through the project area is the Embu-Meru Highway. The main economic activity in the project area is agriculture. Farmers plant tea and coffee in the higher areas of the county and sorghum, maize, green grams and millet in the low altitude areas.

Land use: The project area is in Chuka which is one of the major urban areas in Tharaka Nithi county. Agriculture is the main economic activity in the project area. Cash crops that are grown in the project area are mainly tea and bananas. In the low altitude zones areas, farmers grow food crops such as millet, sorghum and cassava due to the dry conditions. The area's unpredictable rainfall patterns have led to the cultivation of primarily short-term crops. To counter this challenge, some residents have embraced irrigation agriculture and have even set up greenhouses. Among the crops cultivated under irrigation are beans, tomatoes, pumpkins, various vegetables, and onions. The environment in the project area is also well-suited for livestock production, supporting a variety of animals such as, cattle, sheep, goats, and poultry. Figure 2 presents a land use/ land cover map for the project area.

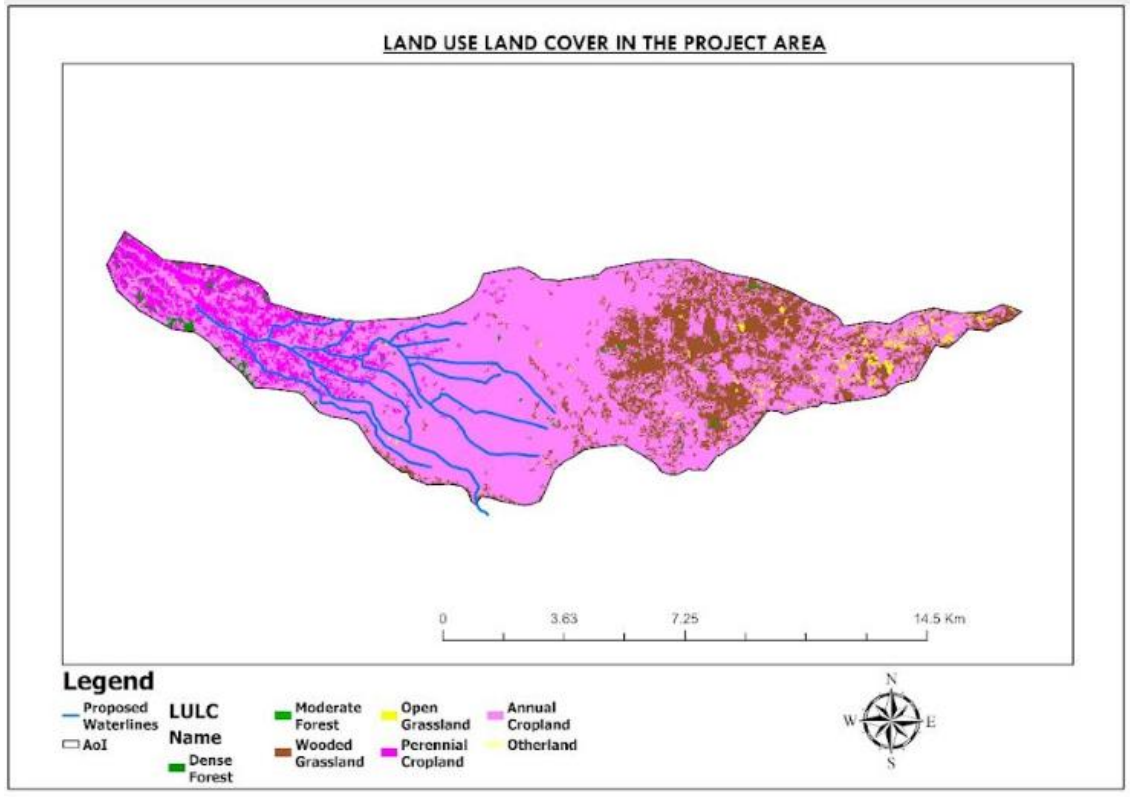

Figure 2: Land Use Land Cover Map

Topography: The topography of Chuka/Igambangombe Constituency is greatly influenced by the Mt Kenya volcanic activity creating 'V' shaped valleys within which the main tributaries of Tana River flow originating from Mt Kenya forest. The highest altitude of the County is 5200m a.s.l within the forest in Chuka/Igambangombe and Maara while the lowest is 600m a.s.l Eastwards in Tharaka.

Hydrology

Ground Water Resources: Largely due to the proximity of the region to Mt. Kenya, the source of all surface water draining the catchment, groundwater sources in the project area have not been extensively exploited. Shallow wells are the most prevalent category of ground water sources. They are found in homesteads in areas where the water table is high. Community water schemes in the area which provide raw water are the main source of water in areas not covered by the water service providers. They draw the water upstream ensuring that the systems are gravity fed. This negates the need to exploit ground water sources which could prove to be more expensive to initiate and operate. Figure 3 presents a photo of a shallow well spotted within the project area.

Figure 3: A shallow well spotted 10 meters from the wayleave

Surface Water Resource: The area's hydrology is highly influenced by the Mt. Kenya ecosystem. The project area is traversed by several rivers which originate from both the Mt. Kenya and Nyambere Hills, flowing Eastwards as tributaries of Tana River. These rivers include; Mutonga, Thingithu, Kathita, Thanantu, Thangatha, Kithinu and Ura River which provide water for Irrigation in the densely populated locations in parts of Tharaka and Chuka. Figure 4&5 shows photographs of rivers in the project areas.

Figure 4: River Manyanga, upstream of intakes works for Chuka Water Project

Figure 5: River Tungu

Drainage Pattern: The drainage pattern of Chuka is primarily dendritic, characterized by a network of interconnected rivers and streams flowing towards the Tana River basin. The 'V' shaped valleys created by volcanic activity contribute to the efficient drainage of water from the highlands to the lowlands. The rivers and streams serve as essential water resources for various purposes, including irrigation, domestic use, and supporting local ecosystems.

Geology and Soils

Geology of the Project area is characterized by the volcanic eruption of Mt. Kenya; the Project area is generally underlain by the Precambrian Basement System which is covered by volcanic rocks and sediments from the eruption of Mt. Kenya. There is apparent water erosion during or after the ice age. The sediments from this erosion form a well-drained soil blanket along the "V" shaped valleys of the rivers. The geology is composed to a large extent of quaternary volcanic rocks, which are overlain by deep soils comprising of dark brown to grayish brown within the area as illustrated in the photograph below.

Figure 6: Alluvial soils within the project area

Flora and Fauna

Biodiversity of the Project location is highly influenced by the Mt. Kenya Forest Ecosystem with respect to indigenous plant cover species. However, due to human activities, the indigenous plant species have been displaced by exotic species that have also acquired economic values among the communities. Such plant species include tea, coffee, Eucalyptus spp, Cypress ssp., Caussurina spp. and Graveria SSP and wattle trees species. Other plant features include grass species, ferns, nippier grass, avocado, banana, yams (mainly in the river flood plains), cassava, sugar cane and arrowroots.

Human habitation and agricultural activities have significantly interfered with both terrestrial and aquatic habitats in the Project area. There is no terrestrial wildlife observed in the Project area since most land is under agricultural use for many years pushing the animals into the Mt. Kenya Forest. However, limited rodents like squirrels, moles and different bird species among others are found in the area. Among the aquatic species present include frogs, fresh water fishes found naturally in the rivers. Livestock keeping is significant with dairy cows, sheep, goats, poultry and house pets (dogs and cats) also constituting part of the wider biodiversity.

Education

The education institutions in the area include primary schools, secondary schools, polytechnics and universities. Some of the Secondary Schools include Chuka Boys High, Chuka Girls High School, Ikuu Boys High School and Ikuu Girls High School. Institutions of higher learning include Rubate Teachers Training College and Chuka University. Photographs below shows some of the learning institutions project in the area.

Figure 7: Chuka High School

Figure 8: Chuka University near Chuka town, afew meters from the proposed project wayleave

Health Facilities

The health facilities within the project area include District Hospitals, Sub-District Hospitals and Health Centres, Dispensaries, Medical Clinics and other private facilities. Among the big hospitals include the Chuka District Hospital and Chuka Cottage Hospital.

Economic Activities

Chuka urban center, the project area, is the largest town in Tharaka-Nithi County. The road network is well developed within the town center and its environs. The Ndagani area in the outskirts of Chuka Town is also fast urbanizing catalyzed by the growth of Chuka University with numerous commercial

and residential developments. Chuka Town has several banks namely Co-operative Bank, Post Bank, Equity Bank, Kenya Commercial Bank, K-Rep Bank and Barclays Bank and other microfinance institutions. Chuka is a predominantly agricultural area with approximately 80% of the population engaged in agricultural activities in growing of tea, coffee, maize, beans, bananas, *sukuma wiki* under micro irrigation, cowpeas, cabbages, etc.

Policy, Legal and Institutional Framework

Table 2 presents the policy, legal and regulatory framework relevant to the proposed Chuka Water LMC Project and their applicability.

Table 2: Relevant Policy, Legal and Regulatory Framework

Policy Framework	**Relevance**
Constitution of Kenya, 2010	Article 43 (1) of the Constitution of Kenya provides that every person has the right– (d) to clean and safe water in adequate quantities. These provisions cover oblige state organs and bind them to provide not just high quality or clean and safe water but also adequate quantities to all people that they will serve. Also, the Constitution of Kenya provides for sound management and sustainable development of all of Kenya's Projects, both public and private investments. It also calls for the duty given to the Project proponent to cooperate with State organs and other persons to protect and conserve the environment as mentioned in Part II.
Kenya Vision 2030	The Vision 2030 maps the development agenda by seeking to make Kenya a globally competitive middle- income country by 2030 (GoK 2012). Chapter 5 of the Vision 2030 blueprint focuses on education, health, water, environment, housing and urbanization amongst other sectors. Vision 2030 is being implemented through a series of five-year Medium- Term Plans (MTP). The MTP identifies the key policy actions and programs for each Ministry Department and Agency (MDA). The overarching objective of the Environment, Water, and Sanitation Sector, as highlighted in the Vision, is to achieve a "clean, secure, and sustainable environment" by the year 2030. The planned development initiatives are focused on enhancing the water accessibility and overall health and hygiene conditions of the community.
National Climate Change Response Strategy, 2010	The strategy paper recognizes that Kenya is a water scarce Country and offers a variety of strategies for ensuring that the resource is utilized in ways that recognize that it is a finite resource. The paper also argues that interventions in the water sector should take a participatory approach involving different water users including gender groups, socioeconomic groups, planners and policy makers in water resource management (Kenya, 2010). These principles will also apply to the proposed project

Policy Framework	Relevance
National Environment Policy, 2012	The revised draft of the National Environmental Policy, 2012 sets out important provisions relating to the management of ecosystems and the sustainable use of natural resources. The project area is in ecological zone V and VI. Ecosystems under these zones are sensitive to any activity out of character with the ecosystem. Therefore, during construction and operation phases of the Project the ESMMP provided in chapter 8 of this report should be implemented, in order to ensure that the ecosystems are not destabilized by the subsequent project activities.
Kenya National Youth Policy 2006	This Policy aims at ensuring that the youth play their role, alongside adults in the development of the Country. The National Youth Policy visualizes a society where youth have an equal opportunity as other citizens to realize their fullest potential. The proposed Water Supply project shall provide direct employment to the youth as required by the Policy.
The Sessional Paper No 1 on National Water Policy 2021	The Sessional Paper proposed a range of measures and actions through which Kenya can respond to the challenges facing the water sector. The Policy re-engineered the water sector through interventions that are geared towards achieving sustainable development in Kenya and in consonance with the sustainable Development Goals, 2030 (GoK 2021). The policy is geared to addressing the emerging challenges and realities in the sector more specifically addressing low sewerage coverage and supply of water resulting from rising population and expansion of economic activities across the sector This undertaking therefore conforms with the government policy as it aims to increase access to water to the residents of Chuka. The last mile connectivity of the Chuka Water Supply Project will give room for increased water supply coverage in Chuka and its environs to improve the hygiene of the municipality. With the growing population in there is need to readjust water supply infrastructure to satisfy the needs of the town
National Policy on Water Resources Management and Development (1999)	The Sessional paper No. 1 of 1999 was established with the objective of preserving, conserving and protecting available water resources and to ensure that water is allocated in a sustainable, rational and economic way. The policy further desires to provide water of good quality and in sufficient quantities that meets the various water needs while ensuring safe disposal of waste water and environmental protection. To achieve these goals, water provision through increased household connections and developing other resources and improved sanitation is required. The proposed Last mile Connectivity of the Chuka water supply is expected to yield benefits for huge town and urban area population, both directly and indirectly. The primary objective of the proposed efforts is to improve the community's access to water hence improved sanitation and hygiene.
Gender Policy, 2011	This Policy Framework aims at mainstreaming gender concerns in the national development process in order to improve the social, legal/civic, economic and cultural

Policy Framework	Relevance
	conditions of women, men, girls and boys in Kenya. The proponent through this ESIA has carried out adequate social assessment of the project and through the ESMP provided adequate measures to comply with the provisions of this legislations on; national legal and policy provisions on gender, HIV/AIDS and Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA).
Sessional Paper No. 10 of 2014 on the National Environment Policy	The policy seeks to develop an integrated approach to environmental management, strengthening the legal and institutional framework for effective coordination, promoting environmental management tools. To achieve this, it is a policy direction that appropriate reviews and evaluations the proposed LMC of Chuka water supply and operations are checked to ensure compliance
National Environmental Sanitation and Hygiene Policy, 2016	The National Environmental Sanitation and Hygiene Policy is dedicated to addressing environmental sanitation and hygiene matters in Kenya, serving as a significant contribution to enhancing the dignity, health, welfare, social well-being, and overall prosperity of all residents in the country. The (Kenya environmental Sanitation and Hygiene Policy 2016)acknowledges that the foundation of healthy and hygienic behaviors and practices originates at the individual level. The proposed last mile connectivity of the Chuka water supply project is in harmony with the policy's objectives to bolster sanitation, hygiene, the utilization of safe drinking water, and effective wastewater management at the household level

Relevant Acts of Parliament and Local Legislations

Table 3: Acts of Parliament

Policy	Applicability
EMCA, 2015	The Act provides for the establishment of a legal and institutional framework for the management of the environment. The following EMCA Regulations are applicable to the proposed Chuka Water Supply LMC Project • EMCA (Waste Management) Regulations, 2006 Legal Notice No. 121; • EMCA (Water Quality) Regulations, 2006 • EMCA (Noise and Excessive Vibration Pollution) (Control) Regulations • EMCA (Air Quality Regulations, 2014)
The Environmental Impact Assessment and Audit) Regulations, 2003	The regulation provides a framework under which Environment and Social Impact Assessment for a Project will be prepared, Regulation 4(1) further states that: (a)"…no Proponent shall implement a project: likely to have a negative environmental impact. (b) for which an environmental impact assessment is required under the Act or these Regulations, unless an environmental impact assessment has been concluded and approved in accordance with these Regulations…"

Policy	Applicability
Noise and Excessive Vibration Pollution (Control) Regulations, 2009	Noise and Excessive Vibration Pollution (Control) Regulations, 2009 The Contractor will be required to ensure compliance with the above regulations in order to promote a healthy and safe working environment throughout the Construction Phase. This shall include regular inspection and maintenance of equipment and prohibition of unnecessary hooting by vehicles. The regulations provide for a maximum of 60 dcl during the day and 35 dcl during the night for a construction site.
Water Act, 2016	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 resources. The proposed Last mile connectivity of the Chuka water supply project is a subsidiary of the Bulk water projects which complied with the Act by acquiring the necessary permits from the relevant bodies in relation to water resources authority.
Land Act, 2012	States that if land is acquired compulsorily under this Act, just compensation shall be paid promptly in full to all persons whose interests in the land have been determined. The proposed LMC for the Chuka water supply project shall fully utilise the road reserves to minimise any form of livelihood displacement. The project proponents have made necessary arrangement for a Resettlement Action Plan in case there are instances of loss of livelihood through land. This has been undertaken in regards also to the requirements of the AfDB Integrated Safeguards Policies
Occupational Safety and Health Act, 2007	The Act safeguards the safety, health and welfare of persons at work and protect persons other than persons at work against risks to safety and health arising out of the activities of persons at work. This Act was found relevant for reference in this ESIA since the construction phase will involve workers who will be exposed to various occupational hazards. The contractor shall be expected to adhere to the requirements of the Act including hiring a safety health and environmental officer who shall be in-charge of enforcement and supervision of compliance during construction phase.
Public Health Act, Revised 2012	The Act provides Guidelines to the Contractor on how he shall manage all wastes (Liquid and Solid Wastes) emanating from the Project in a way not to cause nuisance to the community. This Act, during construction shall be read alongside the waste management regulations of EMCA 2015 for utmost compliance. Section 136 state that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitate the breeding or multiplication of pest shall be deemed nuisances and to be dealt with in the manner provided by this Act.

Policy	Applicability
HIV and AIDS Prevention and Control Act 2011	The object and purpose of this Act is to (a) promote public awareness about the causes, modes of transmission, consequences, means of prevention and control of HIV and AIDS; (b) extend to every person suspected or known to be infected with HIV and AIDS full protection of his human rights and civil liberties. The Act provisions will be applied during Project implementation phase where the contractor will be required to create awareness among workers and community at large.
Sexual Offences Act, 2006	An Act of Parliament that makes provision about sexual offences aims at prevention and the protection of all persons from harm from unlawful sexual acts, and for connected purposes. Section 15, 17 and 18 focuses mainly focused on sexual offenses on minor (children).
Child Rights Act, 2014	This Act of Parliament makes provision for parental responsibility, fostering, adoption, custody, maintenance, guardianship, care and protection of children. It also makes provision for the administration of children's institutions, gives effect to the principles of the Convention on the Rights of the Child and the African Charter on the Rights and Welfare of the Child. The contractor under this Project will be required to comply to provisions of the Act during Project implementation.
Labour Relations Act, 2012	An Act of Parliament to consolidate the law relating to trade unions and trade disputes, to provide for the registration, regulation, management and democratization of trade unions and employers organizations or federations, to promote sound labour relations through the protection and promotion of freedom of association. This act will be applied by labour force on site in addressing disputes related to working conditions.
National Gender and Equality Commission Act 2011	The over-arching goal for NGEC is to contribute to the reduction of gender inequalities and the discrimination against all; women, men, persons with disabilities, the youth, children, the elderly, minorities and marginalized communities. This Act will be applied during hiring of workers.
Public Participation Bill, 2016	The Bill is an Act of Parliament that provides a general framework for effective public participation and to give effect for the constitutional principles of democracy. The purpose of the act includes promotion of democracy and public participation of the people according to article 10 of the constitution, promote community ownership for public decisions and promote public participation and collaboration in governance processes. In adherence to the bill two main stakeholder workshops and Public participation meetings and stakeholder engagement were carried out during the ESIA study to raise awareness about the proposed project and deliberate on anticipated project impacts.
Permits and Licenses	The Proponent should demonstrate compliance to the legislation through acquisition of the appropriate licenses and permits. These includes: NEMA license, approval be

Policy	Applicability
	the road agencies to use road reserves, contractor to handle construction waste by engaging a NEMA licensed handler.

The African Development Bank Integrated Safeguards System, 2013

- OS 1: Assessment and Management of Environmental and Social Risk and Impact
  The Chuka water supply project has undergone an Environmental and Social Impact Assessment process, adhering to both the National Environmental Management Authority regulations and the African Development Bank's Operational Safeguards. All stakeholders, including Project Affected Persons (PAPs), were actively engaged throughout the process. This has resulted in the development of an ESIA report with a comprehensive Environmental and Social Management Plan (ESMP) to ensure the effective management of project impacts.
- OS 2: Land Acquisition, Restrictions on Access to Land and Land Use, and Involuntary Resettlement
  The LMC for the Chuka water supply project has avoided involuntary resettlement by utilizing existing infrastructure, such as road reserves. Additionally, a Resettlement Action Plan (RAP) has been developed to address any potential impacts on PAPs, ensuring adequate compensation and support if necessary.
- OS 3: Habitat and Biodiversity Conservation, and Sustainable Management of Living Natural Resources
  The ESIA process for the Chuka water supply project included an assessment of its impact on biodiversity and ecosystems. Mitigation measures outlined in the ESMP aim to prevent severe impacts on flora and fauna. The project poses minimal threat to the municipality's biodiversity, with less sensitive ecosystems within the project area being prioritized. Additionally, ecologically sensitive areas are safeguarded by provisions outlined in the ESMP.
- OS 4: Resource Efficiency and Pollution Prevention and Management
  The project has developed a Plan to guide waste reduction, segregation, collection, and disposal practices, ensuring compliance with international best practices. Solid waste generated during the construction process will be handled in adherence to the laid down regulations.
- OS 5: Labour and Working Conditions
  The contractor responsible for the LMC for Chuka water supply project will adhere to best practices to ensure the health and safety of employees. Specific measures will be implemented to protect vulnerable groups of workers, such as women, persons with disabilities, and youth, ensuring they are not exploited and are provided with necessary support, in accordance with relevant regulations.

International Conventions and Agreements which Kenya is a Signatory

The proposed project shall also be implemented in adherence to the requirements of international conventions and agreements which Kenya is a signatory to such as the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC); Convention on Biological Diversity, Ramsar Convention on Wetlands and United Nations Convention to combat desertification. The requirements of these Conventions have been discussed in detail in Section 4.4 of this Report.

Stakeholder Engagement and Public Consultation

Stakeholder Engagement Plan

A Stakeholder Engagement Plan has been prepared separately 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:

i. To establish a systematic approach for stakeholder engagement throughout the project cycles
ii. To identify key stakeholders that are affected by the proposed projects, their interests, concerns and influence in relation to project activities
iii. 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
iv. Identify effective ways and methods to disseminate project information as per the needs of the stakeholders
v. 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
vi. 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 meetings and questionnaires. Stakeholder engagement and public consultation will be a continuous activity in all project phases guided by the Stakeholder Engagement Plan. The next project activities that will necessitate stakeholder engagement are:

- Disclosure of the ESIA Report
- Compensation of Project Affected Persons (PAPs)
- Grievance management at various levels
- Project implementation activities
- Monitoring and Evaluation

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 amongst community members including beneficiaries of the proposed project, 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 Water Supply Project.

Table 4: 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

Overall, the project stakeholders expressed their overwhelming support to the proposed project which they felt would improve their access to clean drinking water The filled questionnaires have been attached in the appendices. Key informant interviews were conducted with various stakeholders and their views and recommendations have been included in the report. Table 5 presents the main concerns raised by the stakeholders and the responses given by the technical team.

Table 5: Main Concerns from Public Participation

Issue/Concern	Technical Team Response
Enquiry about compensation of the affected persons	Compensation for all persons that will be directly affected by the projects shall be done diligently following the Resettlement Action plan that shall be formulated by the consultant.
An inquiry whether the local labour force would be prioritized	In a bid to grow the economy of the project area, the contractor shall be keen on hiring locals, especially for unskilled labour.
Inquiry about the economic viability of his land parcel after a pipe line transvers somebody's land.	The community members were informed that they would still carry out agricultural activities on their land parcels after the pipelines were laid but would be limited to growing shallow-rooted crops such as maize and beans. No structures would be allowed along the line to allow for operational maintenance
Dust pollution during excavations	The contractor will ensure sprinkling of roads with water to mitigate against dust during project construction phase
Noise pollution from project vehicles and excavation activities	Contractor will restrict site activities during the day especially for sections requiring heavy use of machinery
Accidents	The proponent will put in place adequate safety measures to be adhered to by contractors and the workers during project implementation.

Issue/Concern	Technical Team Response
	Excavated trenches not to be left unattended
Cases of the pipeline passing through private land	It was confirmed that the proposed project will utilize the road reserve to minimize issues of compensation

Project 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. Figure 9 presents the project grievance management procedure.

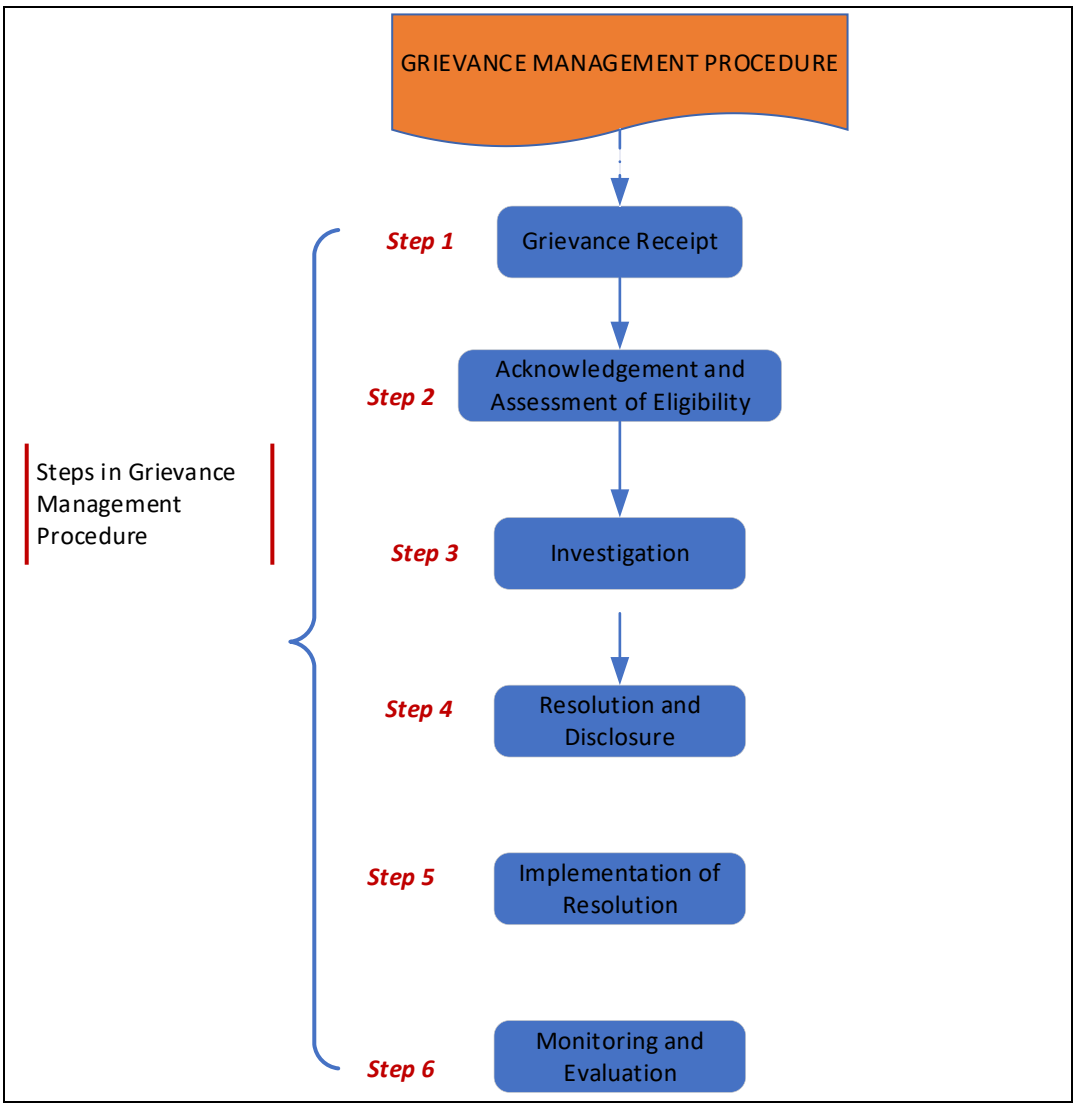

Figure 9: Grievance Management Procedure

Levels of Grievance Redress Mechanism

1. **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 Social Safeguard Officer on conflict resolution, group dynamics, project sustainability among other areas that shall be deemed necessary.

2. **Second Level of Redress: 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 social safeguard specialist, 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.

3. **Third Level of Redress: National Level**

A Grievance Handling Committee at national level shall be formed 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 coordinators 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 a grievance resolution 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 in this report.

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

Positive Environmental and Social Impacts

Improved Access to Clean Water: the proposed Last-mile connectivity will ensure that even the most remote households and communities have access to clean and safe water for drinking, cooking, and hygiene purposes. This will help to reduce waterborne diseases and improves overall public health.
Enhanced Livelihoods: With reliable access to clean water, residents will engage in income-generating activities such as small-scale agriculture and small-scale businesses more effectively. This will contribute to poverty reduction and economic development in the area.
Increased Productivity: Having water readily available at the household level saves time and effort, particularly for women and children who are often responsible for fetching water. This allows them to allocate more time to education, employment, and other productive activities.
Social Equity and Inclusion: Last-mile connectivity will ensure that marginalized communities, including those in the rural areas or informal settlements are not left behind in accessing essential services. This promotes social equity and inclusion within the community.
Resilience to Climate Change: Having a reliable piped water supply system increases within Chuka resilience to climate change-related challenges such as erratic rainfall patterns. Communities are better equipped to withstand water scarcity and adapt to changing environmental conditions.
Public Safety and Hygiene: Access to clean water will facilitate proper sanitation and hygiene practices, reducing the spread of waterborne diseases and improving overall public health outcomes. This contributes to a safer and healthier living environment for residents.
Community Development: Access to piped water can spur community development initiatives, such as the establishment of community gardens, schools, and healthcare facilities, further enhancing the overall quality of life in the area.

Negative Impacts and Mitigation Measures

Table 6: Negative Impacts and Mitigation Measures

Negative Impacts	Mitigation Measures
Disturbance of water Supply in the locality during construction phase	▪ Divide the construction process into phases to minimize the area of disturbance at any given time. ▪ Implement controlled excavation techniques to minimize the disturbance to the surrounding ▪ Community Engagement in the planning and execution of construction activities.
Traffic Congestion	▪ Minimize disruption during peak travel times or major events to help reduce traffic congestion. ▪ Employ temporary traffic control measures including signage, and flagging operations to maintain traffic flow and minimize delays. ▪ Providing prior information to motorists about expected works and alternative routes.

Negative Impacts	Mitigation Measures
	▪ Engaging with the community and stakeholders through public outreach and communication campaigns can raise awareness about construction-related traffic impacts and encourage cooperation and understanding during the project. ▪ The contractor should collaborate with local transportation agencies and authorities to coordinate construction schedules, traffic management strategies.
Loss of Biodiversity	▪ Indigenous trees shall not be cut down but where they have to be cut, compensation of the same through issuance of tree seedlings to the locals should be considered ▪ Transportation of materials and wastes to be done through the existing local roads. ▪ Sensitization of the work-force on environmental conservation and ecological protection. ▪ Re-vegetation of cleared areas with indigenous vegetation species ▪ Selective removal of trees within the construction area, ▪ Minimizing land clearing and disturbance of habitats, where possible the contractor to exercise selective removal of mature, indigenous trees and vegetation.
Noise Pollution	▪ Co-ordinate with relevant agencies regarding all substantial construction activities in the residential areas. ▪ Continuous monitoring of noise levels ▪ Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use, and encourage workers to switch off vehicle engines whenever possible. ▪ Provision of Personal Protective Equipment and clothing (PPE/C) including earmuffs for ear protection to the workers on site ▪ Restrict activities that create noise to daytime only. ▪ Proper maintenance of machinery to avoid unnecessary noise caused by worn out parts.
Solid waste Generation	▪ Develop a comprehensive waste management plan ▪ Prioritization of waste reduction by adopting practices. ▪ Implementation of a system for segregating waste at the source to separate recyclable materials from non-recyclable waste. ▪ Non-recyclable waste to be disposed of properly and in compliance with EMCA (Waste Regulations). A licensed waste management company to transport and dispose of waste at authorized disposal sites shall be sub contracted ▪ Provision of designated areas on-site for the temporary storage of waste materials. ▪ Regular monitoring and inspection procedures to assess waste management practices and identify areas for improvement.

Negative Impacts	Mitigation Measures
Disturbance of Road and Underground Utilities	▪ Prior to excavation a thorough utility location surveys should be conducted to accurately map the location of underground utilities. ▪ Implement safe excavation practices, such as hand digging or hydro excavation, in areas where underground utilities are present. ▪ Coordinate closely with utility providers and local authorities including road authorities to obtain accurate information about the location of underground utilities and coordinate construction activities to avoid conflicts. ▪ Implement restoration of the damaged utilities in the process of excavation within the specified time of addressing the grievance as per the GRM
Air Pollution	▪ Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard. ▪ Project to be undertaken in phases to cushion the cumulative effects of dust, which would be great in case the project is done at once. ▪ Carry out suitable maintenance on all machinery to be used to avoid the emission of noxious gases. ▪ Drivers and machine operator to avoid unnecessary running of motor vehicle engines and machinery when not in use. ▪ Use of wet methods through water sprays and mists as dust suppression measures ▪ Provision of suitable PPE/C such as nose masks to the workers and staff on site.
Increased Water Demand	▪ Efficient water uses on site ▪ Practice water reuse ▪ Prompt repair of leaking water pipes
Public Health and Safety	▪ The contractor to erect safety signage warning the public on danger of construction activities ▪ The contractor to provide all workers with full personal protective gear ▪ The contractor to hire a first aider and provide first-aid kits to the workers at all times ▪ Provision of a general register on site for recording of injuries or any OHS incidence ▪ Preparation of a contingency plan for accident response ▪ Ensure the availability of emergency contacts for police, ambulance, etc.
Displacement of livelihoods	▪ Prepare a Resettlement Action Plan (RAP) capturing all PAPs who will be affected through loss of livelihoods with the aim of compensating them.
Conflicts brought by compensation	▪ Develop a Grievance Redress Mechanism (GRM for PAPs)

Negative Impacts	Mitigation Measures
Disruption of Businesses	▪ Maintain regular communication with affected businesses to provide updates on construction schedules, anticipated disruptions, and mitigation measures. ▪ Seek alternative access routes or pedestrian pathways to businesses affected by road closures or construction activities. ▪ The contractor to schedule construction activities during off-peak hours or non-business hours whenever possible.
Insecurity and Crime	▪ Employ trained security personnel to patrol the construction site and monitor access points 24/7. ▪ Security guards should be equipped with communication devices and trained to respond effectively to security incidents. ▪ Erect secure perimeter fencing around the construction site and implement access control measures such as gates, barriers, and checkpoints to regulate entry and exit. ▪ Only authorized personnel should be allowed access to the site. ▪ Ensure adequate lighting around the construction site, especially during night-time hours. ▪ Foster positive relationships with the local community to encourage community members to report suspicious activity to security personnel or local authorities. ▪ Should securely store valuable construction materials, equipment, and tools when not in use to prevent theft and vandalism. ▪ Collaborate with local law enforcement agencies to address security concerns and coordinate responses to security incidents.
Gender Based Violence	▪ Implement a clear human resources policy against sexual harassment in alignment with national law. ▪ Integrate provisions related to sexual harassment into the employee Code of Conduct (COC). ▪ Appoint human resources personnel responsible for managing reports of sexual harassment according to policy. ▪ Ensure that the Contractor's employees, sub-contractors, sub-consultants, and relevant personnel sign and adhere to a Code of Conduct containing provisions for protection against sexual exploitation and abuse. ▪ Implement provisions that prevent gender-based violence at the community level, including effective community engagement and consultation, especially involving women and girls. ▪ Review project components known to heighten GBV risk at the community level, such as compensation Projects and employment opportunities for women.
Child Labour	▪ Enforce age verification procedures during worker hiring, including ID card checks and face-to-face ID verification.

Negative Impacts	Mitigation Measures
Sexual Exploitation and Abuse	▪ Develop and execute a SEA action plan with an Accountability and Response Framework, ▪ Incorporate SEA prevention measures into Codes of Conduct and maintain ongoing staff sensitization. ▪ Establish procedures for survivor-centred referral and assistance, staff reporting mechanisms, and case oversight, investigation, and disciplinary processes. ▪ Engage the community with confidential complaints mechanisms and PSEA awareness-raising, using community-based IEC materials and outreach. ▪ Integrate SEA considerations into job descriptions, employment contracts, and performance appraisals
Reduced Waterflows Downstream	▪ Implementation a comprehensive plan for managing and conserving the catchment zones within Chuka and Mt Kenya areas. ▪ Establish a robust system for regular monitoring of the spring and surrounding hydrological conditions. ▪ Develop an adaptive management plan that allows for flexible adjustments based on monitoring results. ▪ Involve local communities in the management and monitoring efforts ▪ Implement restoration and rehabilitation measures promptly to enhance water flow.
Vandalism	▪ Foster positive relationships with the community through education, outreach, and collaboration to promote a sense of ownership and responsibility of water supply infrastructure. ▪ Implement surveillance cameras, lighting, fencing, and security patrols to deter vandals and enhance the security of critical facilities. ▪ Raise awareness about the impacts of vandalism on public health, the environment, and community well-being, and encourage reporting of suspicious activities to authorities. ▪ Enforce strict penalties and legal consequences for acts of vandalism, including fines, restitution, and criminal prosecution, to deter future offenses and hold perpetrators accountable
Leadership Wrangles	▪ Utilize existing grievance mechanisms for conflict resolution. ▪ Strengthen the authority and capacity of the Social Accountability and Integrity Committee to perform effectively. ▪ Provide training for committee members on accurate record-keeping and financial management.

ESMP Summary

After a thorough evaluation of the impacts of the LMC for Chuka Water Supply project, an Environmental and Social Management and Monitoring Plan (ESMMP) has been developed to serve as a crucial tool for addressing the identified environmental and social impacts in a systematic and

effective manner. The ESMMP provides a logical framework for mitigating negative impacts and enhancing positive ones by outlining specific measures and actions to be taken throughout the project life cycle.

Table 7: Project Environmental and Social Management Plan

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
PRE-CONSTRUCTION PHASE					
Conflicts from local communities and contractors' workers	▪ 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 when engaging workers ▪ Create awareness to workers and local communities on the project Grievance Redress Mechanism (GRM)	TWWDA Contractor Resident Engineer	Staff records Records of grievances and complaints	Regularly	200,000
Delays in project implementation	▪ Liaison with various road agencies (KENHA, KURA, KERRA) and settlement of necessary fees for road permits to be issues in time to avoid project delays ▪ Liaison with NEMA for project licensing on time	TWWDA	Copies Permits Copy of NEMA license	Regularly	Operational costs
CONSTRUCTION PHASE					
Disturbance of water Supply in the locality	▪ Divide the construction process into phases to minimize the area of disturbance at any given time. ▪ Repair of leaks and instances of bursts caused by construction activities ▪ Implement controlled excavation techniques to minimize the disturbance to the surrounding sand ▪ Plan construction activities to occur during wet seasons when water is sufficient within homesteads. ▪ Community Engagement in the planning and execution of construction activities.	TWWDA Contractor	Leaks and incidences of bursts caused by construction activities	Continuous	500,000
Traffic Congestion	▪ Minimize disruption during peak travel times or major events can help reduce traffic congestion.	Contractor	Traffic jams	Continuous	N/A

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
	▪ Employ temporary traffic control measures including signage, and flagging operations to maintain traffic flow and minimize delays. ▪ Providing prior information to motorists about expected works and alternative routes. ▪ Engaging with the community and stakeholders through public outreach and communication campaigns can raise awareness about construction-related traffic impacts and encourage cooperation and understanding during the project. ▪ The contractor should collaborate with local transportation agencies and authorities to coordinate construction schedules, traffic management strategies.				
Loss of Biodiversity	▪ Transportation of materials and wastes to be done through the existing local roads. ▪ Sensitization of the work-force on environmental conservation and ecological protection. ▪ Re-vegetation of cleared areas with indigenous vegetation species ▪ Selective removal of trees within the construction area, ▪ Minimizing land clearing and disturbance of habitats, where possible the contractor to exercise selective removal of mature, indigenous trees and vegetation.	TWWDA Contractor	Trees count and vegetation cleared	Continuous	N/A
Noise Pollution	▪ Co-ordinate with relevant agencies regarding all substantial construction activities in the residential areas. ▪ Continuous monitoring of noise levels ▪ Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use, and encourage workers to switch off vehicle engines whenever possible. ▪ Provision of Personal Protective Equipment and clothing (PPE/C) including earmuffs for ear protection to the workers on site	Contractor /Proponent	Noise levels	Continuous	10,000

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
	▪ Restrict activities that create noise to daytime only. ▪ Proper maintenance of machinery to avoid unnecessary noise caused by worn out parts.				
Solid waste Generation	▪ Implement the project waste management plan ▪ Prioritization of waste reduction by adopting practices. ▪ Implementation of a system for segregating waste at the source to separate recyclable materials from non-recyclable waste. ▪ Non-recyclable waste to be disposed of properly and in compliance with EMCA (Waste Regulations). A licensed waste management company to transport and dispose of waste at authorized disposal sites shall be sub contracted ▪ Provision of designated areas on-site for the temporary storage of waste materials. ▪ Regular monitoring and inspection procedures to assess waste management practices and identify areas for improvement.	Contractor	Litter on site	Continuous	50,000
Disturbance of Road and Underground Utilities	▪ Prior to excavation a thorough utility location surveys should be conducted to accurately map the location of underground utilities. ▪ Implement safe excavation practices, such as hand digging or hydro excavation, in areas where underground utilities are present. ▪ Coordinate closely with utility providers and local authorities including road authorities to obtain accurate information about the location of underground utilities and coordinate construction activities to avoid conflicts. ▪ Implement restoration of the damaged utilities in the process of excavation within the specified time of addressing the grievance as per the GRM	Contractor	Reported cases of breakage of utilities	Continuous	1,000,000
Air Pollution	▪ Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard.	Contractor	Air Quality	Continuous	N/A

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
	▪ Project to be undertaken in phases to cushion the cumulative effects of dust, which would be great in case the project is done at once. ▪ Carry out suitable maintenance on all machinery to be used to avoid the emission of noxious gases. ▪ Drivers and machine operator to avoid unnecessary running of motor vehicle engines and machinery when not in use. ▪ Use of wet methods through water sprays and mists as dust suppression measures ▪ Provision of suitable PPE/C such as nose masks to the workers and staff on site.				
Increased Water Demand	▪ Efficient water uses on site ▪ Practice water reuse ▪ Prompt repair of leaking water pipes	Contractor	Water usage	Continuous	N/A
Public Health and Safety	▪ The contractor labels and warn the public on the danger of construction activities ▪ The contractor to provide all workers with full protective gear ▪ The contractor to train and provide of First-aid Kit to the workers ▪ Provision of a general register on site for recording of injuries or any OHS incidence ▪ Putting up signages to caution possible hazards ▪ Preparation of a contingency plan for accident response ▪ Ensure the availability of Emergency contacts for police, ambulance, etc. ▪ Emergency plans should be communicated and well understood	TWWDA Contractor	Injuries/Fatalities/Near misses record	Continuous	20,000
Disruption of Businesses	▪ Maintain regular communication with affected businesses to provide updates on construction schedules, anticipated disruptions, and mitigation measures. ▪ Seek alternative access routes or pedestrian pathways to businesses affected by road closures or construction activities.	TWWDA Contractor	Number of reported cases	Continuous	50,000

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
	▪ The contractor to schedule construction activities during off-peak hours or non-business hours whenever possible.				
Insecurity and Crime	▪ Employ trained security personnel to patrol the construction site and monitor access points 24/7. ▪ Security guards should be equipped with communication devices and trained to respond effectively to security incidents. ▪ Erect secure perimeter fencing around the construction site and implement access control measures such as gates, barriers, and checkpoints to regulate entry and exit. ▪ Only authorized personnel should be allowed access to the site. ▪ Ensure adequate lighting around the construction site, especially during night-time hours. ▪ Foster positive relationships with the local community to encourage community members to report suspicious activity to security personnel or local authorities. ▪ Should securely store valuable construction materials, equipment, and tools when not in use to prevent theft and vandalism. ▪ Collaborate with local law enforcement agencies to address security concerns and coordinate responses to security incidents.	Contractor	Crime cases related to the project	Continuous	250,000
Gender Based Violence	▪ Implement a clear human resources policy against sexual harassment in alignment with national law. ▪ Integrate provisions related to sexual harassment into the employee Code of Conduct (COC). ▪ Appoint human resources personnel responsible for managing reports of sexual harassment according to policy. ▪ Ensure that the Contractor's employees, sub-contractors, sub-consultants, and relevant personnel sign and adhere to a Code of Conduct containing provisions for protection against sexual exploitation and abuse.	Contractor/ Proponent	Reported Cases	Continuous	70,000

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
	▪ Implement provisions that prevent gender-based violence at the community level, including effective community engagement and consultation, especially involving women and girls. ▪ Review project components known to heighten GBV risk at the community level, such as compensation Projects and employment opportunities for women.				
Child Labour	▪ Enforce age verification procedures during worker hiring, including ID card checks and face-to-face ID verifications.	Contractor/ Proponent	Reported Cases	Continuous	N/A
Sexual Exploitation and Abuse	▪ Develop and execute a SEA action plan with an Accountability and Response Framework, ▪ Incorporate SEA prevention measures into Codes of Conduct and maintain ongoing staff sensitization. ▪ Establish procedures for survivor-centred referral and assistance, staff reporting mechanisms, and case oversight, investigation, and disciplinary processes. ▪ Engage the community with confidential complaints mechanisms and PSEA awareness-raising, using community-based IEC materials and outreach. ▪ Integrate SEA considerations into job descriptions, employment contracts, and performance appraisals	Contractor / Proponent	Reported Cases	Continuous	120,000
TOTALS COST FOR CONSTRUCTION PHASE					**2,070,000**
OPERATION PHASE					
Reduced Water flows Downstream	▪ Implementation a comprehensive plan for managing and conserving the catchment zones within Chuka and Mt Kenya areas ▪ Establish a robust system for regular monitoring of the spring and surrounding hydrological conditions. ▪ Develop an adaptive management plan that allows for flexible adjustments based on monitoring results.	NIWASCO TWWDA NEMA WRA	Water flow	Quarterly	Operational Costs

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
	▪ Involve local communities in the management and monitoring efforts ▪ Implement restoration and rehabilitation measures promptly to enhance water flow.				
Gender Based Violence	▪ Develop and execute provisions to prevent GBV at the community level resulting from the project. ▪ Engage and consult consistently with the community, especially women and girls, to curb GBV risks. ▪ Assess and adjust project components that heighten GBV risk, such as compensation and employment Projects for women. ▪ Establish a specific plan to sensitize the community on gender-equitable approaches to compensation and employment. ▪ Establish clear referral mechanisms for reporting GBV cases linked to project implementation.	Kenya Police Service NIWASCO	Number of reported cases	Continuous	Operational Costs
Vandalism	▪ Foster positive relationships with the community through education, outreach, and collaboration to promote a sense of ownership and responsibility of water supply infrastructure. ▪ Raise awareness about the impacts of vandalism ▪ Enforce strict penalties and legal consequences for acts of vandalism, including fines, restitution, and criminal prosecution, to deter future offenses and hold perpetrators accountable	NIWASCO	Number of vandalism cases reported	Regularly	Operational costs
Occupational Health and Safety Hazards	▪ Document and communicate the safe operating procedures to the workers: this will involve creating detailed written instructions and guidelines that outline the specific steps, precautions, and best practices to be followed when carrying out a particular task or operation. ▪ Safety Training of workers: Provide comprehensive safety training to workers on a regular basis. Ensure workers are aware of potential hazards and understand safety protocols.	NIWASCO	Number of OHS hazards reported	Regularly	Operational costs

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
	▪ Provision and enforcement of use of appropriate Personal Protective Equipment including helmets, gloves, safety boots, and high-visibility vests.				
Water discharges during flushing/ cleaning of pipes to remove sediments	▪ Identify environmental issues that need mitigation during operation of the Project component. ▪ Develop management plans and procedures needed to address the environmental concerns ▪ Monitor and evaluate the performance against set targets ▪ Set a budget for environmental management and restorations ▪ Schedule for revising and updating the ESMMP ▪ Initiate sensitization programmes on best practices on solid waste management right from the source, sorting, transportation and disposal ▪ Conducting an initial audit in the first year of operation of the projects and subsequent annual audits of the operational activities.	NIWASCO	Soil and water quality test results Environmental Audit results	Regularly	Operational costs
DECOMMISSIONING PHASE					

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
Water Scarcity	▪ Identify and develop alternative water sources in close proximity to Chuka to ensure a continuous and reliable water supply for the community ▪ Raise awareness among the community about the upcoming decommissioning exercise ▪ Implement measures to enhance the community's resilience to drought, such as establishing community water storage facilities, emergency water distribution plans, and drought-tolerant crop cultivation. ▪ Collaborate with relevant stakeholders, including government agencies, NGOs, and local communities, to develop and implement a comprehensive water resource management plan for the region ▪ Promote the installation of rainwater harvesting systems in households and public facilities to supplement water supply during dry periods	TWWDA NIWASCO	Minutes of meeting with the local community Alternative projects in the area Water resource management plan	Continuous	To be determined
Air Pollution	▪ Provide appropriate Personal Protective Equipment (PPE) for decommissioning workers ▪ Apply water on uneven or bare areas at the project site and nearby access roads to suppress dust	TWWDA NIWASCO Contractor	Availability of PPEs	Continuous	To be determined
Solid Waste Generation	▪ Implement careful demolition practices to maximize material reusability ▪ Sell or donate reusable/recyclable materials to minimize waste ▪ Follow an approved Decommissioning plan by NEMA for proper site rehabilitation and waste management •	TWWDA NIWASCO Contractor	Decommissioning Plan Inventory of waste materials from decommissioning	Continuous	To be determined

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
Water Pollution	▪ Develop and implement a comprehensive waste management plan for proper handling and disposal of materials and waste generated during decommissioning. ▪ Minimize the use of harmful chemicals and substances during the process, and properly manage potential contaminants. ▪ Establish spill prevention and response protocols, and have spill kits and containment measures on hand. ▪ After decommissioning, undertake site re-vegetation and restoration to stabilize soil, reduce erosion, and prevent runoff of pollutants into water bodies. •	TWWDA NIWASCO Contractor	Waste management plan Restored project sites Number of indigenous tress planted	Continuous	To be determined
Noise and Vibration	▪ Conduct noisy activities during daytime hours to minimize disruption to nearby residents. ▪ Use noise-reducing equipment and machinery to lower noise emissions. ▪ Regularly maintain and inspect equipment to prevent excessive noise due to mechanical issues. ▪ Limit idling time for small equipment and encourage workers to turn off vehicle engines when not in use. ▪ Enclose noisy machinery in soundproof enclosures to contain noise emissions. ▪ Provide workers with earmuffs and other protective gear for noise reduction. ▪ Inform nearby residents and workers about construction activities and noise levels to manage expectations and reduce disruptions ▪ Comply with local noise regulations and guidelines to ensure noise levels remain within acceptable limits	TWWDA NIWASCO Contractor	Number of complaints	Continuous	To be determined
Occupational Health and Safety Concerns	▪ Supply appropriate Personal Protective Equipment (PPE) for workers ▪ Provide training to workers on general safety and first aid	TWWDA NIWASCO Contractor	Records on accidents Training Reports	Continuous	To be determined

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
	▪ Establish designated pathways for machinery and personnel movement. ▪ Implement mechanisms for reporting incidents, accidents, and dangerous occurrences				
TOTAL ESMP Budget					**2,270,000**

Monitoring of ESMP

Environmental concerns, that will be monitored and audited during the project's construction and operational period include: water quality, air quality, and occupational health and safety issues

Table 8: Monitoring of Occupational Health and Safety Issues

Monitoring Parameters	Responsibility	Monitoring Location(s)	Time/Frequency	Indicators
Construction Phase				
Condition of machinery and equipment	Contractor	At work stations	Weekly	Service, maintenance, repair or replacement records of faulty machines
Accidents, incidents, injuries etc.	Contractor	At work stations	Daily	Mitigation/prevention measures in place, PPEs, Records of incidents or accidents, medical records, Training, First Aid kits; Fire extinguishers
Dust and exhaust emission	Contractor	At work stations	Daily	Health safety measures in place
Noise emissions	Contractor	At work stations	Daily	Noise monitoring records
Sanitation and welfare facilities	Contractor	Workers camps, construction sites and site 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
Operation Phase				
BOD, Temperature, Total Suspended Solids (TSS), COD, ammonia nitrogen (NH3-N), PH and faecal coliform counts	NIWASCO	Treated water at Treatment Plant and various sampling points along the distribution	Daily, weekly as required	Quality of water downstream

Monitoring Parameters	**Responsibility**	**Monitoring Location(s)**	**Time/Frequency**	**Indicators**
		pipelines		
Water Quality Monitoring Plan				
BOD, Temperature, Total Suspended Solids (TSS), COD, ammonia nitrogen (NH3-N), PH and fecal coliform counts	NIWASCO	Treated water at discharge point from WTP	Daily, weekly as required	Quality of water downstream

ESMP Implementation Plan

Table9: Roles and Responsibilities of various entities in ESMMP implementation

Entity	Roles and Responsibilities in ESMMP Implementation
Tana Water Works Development Agency (TWWDA)	• To ensure that all project operations are conducted in accordance with their internal environmental policies and in accordance with the ESMMP • Ensure that all authorizations/Approvals/Licenses required for project implementation are obtained; • Request the contractor operates on the basis of valid Authorizations/approvals/licenses for the activities to be implemented; • Ensure that the ESMMP is an integral part of the contract document with the Contractor and that the contractor will be responsible for its implementation; • Ensure that the contractor's contract has specific OHS clauses such as: (i) the General rules of Hygiene health and safety (HHS) on construction sites (ii) the STD - HIV awareness (iii) the management of the relationship between employees and the communities in the project area, with the emphasis on the protection of minors and other vulnerable (iv) the consideration of gender equity and gender-based-violence (GBV) as well as sexual exploitation and abuse • Establish institutional linkages with relevant parties in the project implementation as needed, or designate a representative for that purpose; • Ensure that the various project activities comply with the mitigation measures proposed in the Environmental Management and Monitoring Program (ESMMP); • Make regular inspections to all the different activities with regard to social aspects, health, safety and environment and check for any non-conformity with the ESMMP attributable to the Contractor and identify the steps taken for its correction

Entity	Roles and Responsibilities in ESMMP Implementation
National Environmental Management Authority (NEMA)	Regulatory function • Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plans, programmes and projects. • Identify projects and programmes or types of projects and programmes, plans and policies for which environmental audit or environmental monitoring must be conducted under this Act; • Monitor and assess activities, including activities being carried out by relevant lead agencies, in order to ensure that the environment is not degraded by such activities
Nithi Water and Sanitation Company (NIWASCO)	• Operate and maintain the water supply system in a manner that will reduce non-revenue water • Manage any sewer spills and clear and disinfect affected properties or environment • Carry out effluent quality analysis in collaboration with other government lead agencies • Ensure treated wastewater and sludge for re-use/disposal meets accepted health standards • Conduct regular monitoring and inspection to ensure facilities are not interfered with • Ensure that effluent discharged from industries into the sewage system is treated and meets effluent discharge quality standards
Contractor	• Prepare own ESMP implementation plan as well as a health and safety plan within 30 days of signing of the contract. • Operate on the basis of valid Licenses/Approvals/Authorizations for the activities to be implemented; • Prevent or minimize the occurrence of accidents which might cause damage to the environment and be able to respond positively to an accident if it occurs; • Ensure compliance to working procedures and environmental requirements and health and safety established in the contract with the Proponent; • Minimize environmental damage, waste control, avoid pollution, prevent loss or damage on natural resources and minimize the effects on the users and occupants of surrounding lands and the public; • Provide Personal Protective Equipment (PPE) to workers which are appropriate to the tasks to be performed and ensure that it is used; • Manage the complaints process on the elements that fall within its jurisdiction, or refer complaints to the Proponent, so that they can receive treatment/appropriate response;

Entity	Roles and Responsibilities in ESMMP Implementation
Supervising Consultant/ Resident Engineer	• To ensure that the ESMMP is upto-date and is being used by the contractor. • Conduct periodic audits of the ESMMP to ensure that its performance is as expected
County Government of Tharaka Nithi	• The relevant departmental officers in the above county government will be called upon where necessary during Project implementation to provide the necessary permits and advisory services to the project implementers
Directorate of Occupational Safety and Health Services (DOSHS)	• To register the project site as a work station and subsequent enforcement of relevant provisions in occupational safety and health in line with Occupational Safety and Health Act, 2007.
Water Resource Authority (WRA)	• Monitor and enforce conditions attached to water permits and water use; • Regulate and protect water resources quality from adverse impacts; • Regulate and protect water resources from adverse impacts; • Regulate water infrastructure, use and effluent discharge; • Work with the beneficiary communities to manage and protect water catchments; • Establish water resources monitoring networks

1. INTRODUCTION

1.1. Background Information

Water scarcity poses a significant challenge in urban areas across the globe, with particularly pronounced impacts. Enhancing the calibre and accessibility of water in these areas, while adhering to sustainable parameters, stands as a crucial prerequisite for enhancing both health and economic progress. Water scarcity and land degradation stand out as primary factors leading to diminished agricultural yields and income losses in Tharaka Nithi. The majority of households in this region heavily depend on a range of activities including agriculture, sourcing water and firewood, However, shifts in climatic patterns have posed significant challenges to these communities, undermining their ability to sustain their daily livelihoods.

Water stands as a universal factor and a pivotal catalyst for development on a global scale. Within Tharaka Nithi County, Kenya, it holds an unparalleled status as the foremost development imperative and indispensable resource. The quest for water profoundly occupies the thoughts and actions of the Tharaka Nithi community, given the scarcity of accessible water sources, which primarily comprise seasonal rivers and a limited number of fleeting wells.

Tana Water Works Development Agency (TWWDA) is one of the nine Water Works Development Agencies (WWDAs) established under the Water Act, 2016 and whose areas of jurisdiction are Nyeri, Meru, Embu, Kirinyaga and Tharaka Nithi County. Among the Agency's mandate is to undertake the development, maintenance and management of the national public water works within its area of jurisdiction. The Africa Development Bank has been supporting the GoK in its Water Sector Reforms through financing of Programmes towards improvement of Water and Sanitation Services in the Country. Tana Water Works Development Agency (TWWDA) through GoK received funds from African Development Bank (AfDB) to undertake Projects under the Kenya Towns Sustainable Water Supply and Sanitation Program (KTSWSSP). Among the projects under the program include Construction of Chuka Water Supply among others.

The project was designed into two phases, where phase one covered work done from the intake to the treatment plant and to the storage tanks and a mainline to the beneficiary community. This phase did not cover the connectivity network from the main line through the submain lines to the beneficiary communities. To ensure last mile connection Phase two of the project was proposed to ensure there is a good distribution system that can adequately serve the proposed beneficiaries once the project was handed over to the local Water Service Provider (WSP).

In fulfilling AfDB policies and the laid down environmental and development policies and legislations of Kenya, the proponent commissioned the Experts to prepare this Environmental and Social Impact Assessment Project Report for the Proposed Last Mile Connectivity of Water Supply Project in Chuka.

The report provides a comprehensive project background as well as an assessment of the associated beneficial and adverse environmental and social impacts of the development together with its mitigation measures.

1.2. Rationale of the ESIA

The rationale behind conducting an Environmental and Social Impact Assessment is grounded in Kenyan law, which mandates that all development projects must undergo this assessment as a fundamental prerequisite. In addition, the Environmental and Social Operating Standards (E&S OSs) provided by the African Development Bank Group's Integrated Safeguards System 2013 provide the responsibilities of Borrowers in identifying and assessing environmental and social risks associated with projects funded by the Bank. This assessment is integral to the project's planning stages, ensuring that its significant effects on both the natural and social surroundings are thoroughly examined across the project's entire life cycle, spanning from its conception and construction to its operation and eventual decommissioning.

In adherence to the national and international legal obligations, an "Integrated Environmental Assessment" methodology was employed to appraise the proposed project, resulting in the creation of a Project Report for the Last Mile Connectivity of water supply project in Chuka in Tharaka Nithi County.

1.3. Objectives of the ESIA

The primary goal of the ESIA is to identify and assess the potential environmental and social impacts, both positive and negative, that are likely to arise during the establishment and operation of the proposed project. The activity aimed to propose suitable measures for mitigating any adverse impacts while appraising the positive ones. This objective aligns with the overarching objective of safeguarding the environment in terms of social well-being, health, economic factors, and the physical condition of the area including soil, water, climate and biodiversity.

In brief, the specific objectives of the study were to:

- To identify all potential significant adverse environmental and social impacts of the proposed project and recommend measures for mitigation.
- To verify compliance with the environmental regulations and industry's standards into planning, development, implementation and management of the project.
- To generate baseline data for monitoring and evaluation of how well the mitigation measures will be implemented during the project cycle.
- To recommend cost effective measures to be implemented to mitigate against the expected impacts.

- To provide guidelines to stakeholders participating in the mitigation of adverse social impacts of the project
- Carry out stakeholders' participation and consultations to collect the concerns, expectations, and opinions of affected, concerned and interested stakeholders.
- Prepare a comprehensive Environmental and Social Management Plan (ESMP)
- To prepare an environmental Impact assessment report compliant to the Environmental management and Coordination Act CAP 387 and detailing findings and recommendations

1.4. Data Collection Procedures and Methodology

Data collection encompassed a range of methods including questionnaires, on-site observations, photography, field visits, desktop environmental studies, and scientific tests, as stipulated by the Environmental (Impact Assessment and Audit) Regulations of 2003, and the international best practice.

The resulting report embraced a comprehensive approach, evaluating multiple dimensions including environmental, social, cultural, economic, safety, and health impacts inherent to the project. Through this integrated perspective, all potential adverse effects were identified and suitably mitigated. Considering the project's nature and scope, an Environmental Impact Assessment (EIA) project report was developed to ensure a comprehensive consideration of all aspects within the ESIA framework. The assessment methodology employed during this process adhered to the following sequence.

1.4.1. Environmental Screening

Based on the amended 2nd schedule of the Environmental Management and Coordination Act (EMCA Cap 387), the Proposed Last mile Connectivity of the Water Supply Project is categorized as a medium-Risk Project. The initial screening process indicated that the expected environmental issues associated with the project would be minimal.

Similar to any other project, the proposed development is anticipated to have specific impacts. However, these impacts are expected to be minor, and in cases where adverse effects may occur, a mitigation strategy will be implemented. Examples of such impacts include dust, noise, health, and safety concerns during both the construction and operational phases of the project. These impacts have been clearly identified during the screening stage and are detailed in the report. The report also includes comprehensive mitigation measures that have been developed and described in the Environmental and Social Management Plan.

1.4.2. Desktop Study

The desktop study encompassed a thorough review of various documents pertaining to the proposed activities, project specifications, and project layout. This review encompassed a wide range of

materials, including policy and legislative frameworks, as well as an analysis of the environmental context of the area. The key documents examined during this process included the following: Kenya's policies, strategies, and guidelines; relevant national and county laws and regulations, Literature regarding water Infrastructure and, where applicable, Multilateral Environmental Agreements (MEAs).

1.4.3. Physical Inspection of the Site and Surrounding

Physical inspection of the proposed site which included field investigation at site and surrounding areas was done from 12th February 2024 to 16th, February 2024. The field investigation aimed to visually examine the site's characteristics and evaluate the existing environmental conditions in the vicinity. The purpose of this inspection was to determine the potential impacts that the project may have on the environment and the community as well.

1.4.4. Public Participation

As part of the ESIA process, public participation was facilitated through public baraza, questionnaires, as well as interviews with key stakeholders and informants. The information gathered through these questionnaires were carefully analysed and integrated into the ESIA Summary Project Report.

In light of the project's characteristics and the expected outcomes, public engagement meetings were organized with the aim of engaging the beneficiaries, project affected persons and the adjacent community as in the table below.

Table 1.1: Attendance for the Public Participation for the proposed project

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 meetings were undertaken to ensure that the insights and viewpoints of the local population were taken into account, acknowledging the vital role they play in shaping the project's success. To deepen the project's comprehension of the circumstances, a sequence of key informant interviews and consultations was undertaken. These engagements, expounded upon in Chapter 5 of the project documentation, were strategically conducted to gather the insights and standpoints of pivotal stakeholders deeply involved in the project's consequences. This approach facilitated the understanding of various viewpoints, contributing to a well-rounded perspective on the matter.

In addition, a total of 30 questionnaires were distributed to systematically capture the concerns and viewpoints of people residing within the project's immediate surroundings. This method ensured that a diverse range of perspectives were incorporated, aiding in the development of a comprehensive understanding of the community's needs and expectations.

1.4.5. Data Analysis, Documentation and Report Structure

The Environmental Impact Assessment report was prepared based on the findings in adherence to the EIA guidelines provided by the National Environment Management Authority (NEMA) for the preparation of a Comprehensive Project Report.

The ultimate outcome of the assessment process is the production and documentation of this Comprehensive Project Report, which is specifically designed to ensure that the proposed development aligns with the requirements of the Environmental Management and Coordination Act (EMCA, Cap 387). The report is structured into ten chapters, which are outlined as follows:

Chapter 1: Introduction: Gives Background Information to the Study Describing the Objectives and the methodology adopted for the ESIA Study
Chapter 2: Nature of the project: Description of the proposed Chuka Water Supply LMC Project
Chapter 3: Baseline Environmental Conditions
Chapter 4: Legal Policy and Institutional Framework
Chapter 5: Public Participation, Stakeholder Consultation and Grievance Redress Mechanism
Chapter 6: Analysis of Project Alternatives
Chapter 7: Anticipated Impacts and Mitigation Measures
Chapter 8: Environmental and Social Management & Monitoring Plan (ESM&MP)
Chapter 9: Conclusion and Recommendations
Chapter 10: References
Chapter 11: Appendices

2. NATURE OF THE PROJECT

2.1. Description of the Existing system

Water Supply Services in Chuka are managed by Nithi Water and Sanitation Company (NIWASCO) who is the licensed Water Service Provider (WSP). In addition to the NIWASCO system, there are several community water supply schemes which supply raw water for domestic consumption and irrigation. These community water supply schemes have pipeline networks that run parallel to the WSP networks in the urban areas and extend to rural areas beyond the NIWASCO network.

2.1.1. Existing Intake Works

The existing intake works is on Mara Manyi River. It is a reinforced concrete weir intake constructed in 1977 at elevation 1661.40 m ASL. The intake structure has a primary weir and secondary weir opening into a diversion channel directing water to an inlet chamber through coarse and fine screens.

2.1.2. Existing Raw Water Gravity Mains

There are 2 Nr. OD 250mm uPVC Raw Water Gravity Mains, one constructed in 1977 and the other in 2001. The pipelines are 3km long traversing the dense Mt. Kenya Forest. Each raw water main has a capacity of 4000m^3/day. There is another raw water main of OD 450mm constructed in 2022 with a capacity of 15000m^3/day.

2.1.3. Existing Water Treatment Works

The existing Kiang'ondu Water treatment works at elevation 1620.90 m ASL is comprised of two independent water systems i.e.

- Inlet Works, Plain sedimentation capacity 3,500m3/day and chlorination. The existing sedimentation tanks are not connected to the existing filters.
- Direct filtration of raw water with rapid gravity sand filters, capacity 3500m3/day and chlorination.

The Kirege Treatment Works is located at the edge of the Mt. Kenya Forest within the Nyayo Tea Plantations at UTM coordinates 344915m E and 9962387m S along Kangoro – Kianjeru road. It has a capacity of 15000m^3/day and caters for the Year 2037 water demand for Chuka Service area.

2.1.4. Existing Distribution System

For the Kiang'ondu Water treatment Works, the distribution network was first constructed in 1977 in Kiang'ondu area and Chuka town with subsequent expansion works over the years. The approximate total length of transmission mains is 60km with diameters ranging from

50mm – 250mm uPVC and HDPE pipes. There are 15 Nr. Tanks in the distribution network with capacities ranging from 50m^3 – 1,000m^3. The location of storage tanks and the pipeline routing ensures a gravity system with no pumping required.

The Kirege Treatment Works constructed in the year 2022 comprises of Bulk Water Transmission lines to strategically located water tanks that supply to various supply zones delineated based on topography in Chuka. These tanks augmented the existing tanks constructed for the transmission network from the Kiang'ondu treatment works. The capacities of the tanks range from 100m^3 to 500m^3. The approximate length of the transmission mains is 15km with pipe sizes ranging from 250mm – 400mm.

2.2. The proposed Project Objectives

To address the challenge of large-scale infrastructure projects failing due to an overemphasis on costly first-mile components, the technical designs for additional Water Supply Distribution was designed to prioritize efficiency, sustainability, and inclusivity. This entails balancing investments between first-mile infrastructure and essential smaller-scale components to ensure comprehensive service delivery. Towards the resolution of this, the technical designs for of additional Water Supply Distribution (Last Mile Connectivity) for Chuka shall comply with six key criteria:

1. Raise water supply reliability in the target area.
2. Reduce consumer connectivity distance.
3. Widen consumer base thereby contributing to the long-term financial sustainability of water services.
4. Improve household's welfare via adequate service level.
5. Improve on urban sanitation in the target area.
6. Reduce the adverse impacts of water use on the ecosystems and biodiversity

2.3. Proposed Project Design Criteria

The following references were used in defining the design criteria:

- Ministry of Water and Irrigation Design Manual for Water Supply in Kenya, 2005.
- Al-Layla M.A, Ahmad. and Middlebrooks E.J (1978), Water Supply Engineering Design, Michigan, Ann Arbor Science Publishers.
- Ministry of Water and Irrigation-Tanzania (2007), Design Manual for Water Supply and Waste Water Disposal.
- Kenya National Bureau of statistics (2019) Kenya Population and Housing Census – Analytical Report on Population Projection Vol XIV).
- Feasibility Study Report (Chuka Water Supply Feasibility Report)

2.4. Appurtenances

2.4.1. Air Valves

Air valves have been provided along the pipeline to protect the system from trapped air or from collapse due to vacuum. The following was considered in locating and designing the air valves:

- Located at all notable high points along pipeline.
- Where the pipeline section is flat and long, air valves are to be installed at approximately 600m intervals.
- Double orifice air valves were selected in sections where air lock and vacuum are likely to occur otherwise single orifice air valves were selected.
- The air valves were equipped with isolation valves for easy removal and repair.
- Selected air valve size ranges were 25mm, 50mm and 80mm diameter depending on the size of the main pipe as indicated in the figure below.

2.4.2. Washouts

The following was considered in locating and designing the washouts:

- Washouts were provided at selected notable low points in the pipeline for flushing sediments from the system.
- Provision was also made for an open drain or drain pipe to lead the water from the washout to a suitable discharge point nearby.
- The ends of supply pipelines were also provided with washouts as long as they are sloping towards the end.
- A gate valve was located on the wash out pipeline as appropriate.
    a. 50mm and 80mm washout size was selected depending on the size of the main pipeline.
    b. Spill chambers have been provided for the washout out flow.

2.4.3. Section Valves

Section valves have been provided for in the design to facilitate operation and maintenance of the system including managing water rationing. Section valves shall be located in the following positions:

a. At the branching point i.e., at the start of every distribution line.
b. Before and or after major structures such as the intake and water tanks 2-3 km apart along the pipeline.

2.4.4. Valve Chambers

Rectangular or square masonry chambers have been designed to house the section valves, air valves and washout valves. Some of the considerations made in the design of the chambers include;

- The internal dimension of at least 1000mm x 1000mm and a height dependent on the site conditions. This will allow adequate space for operation.
- Only steel pipe fittings inside the chamber have been selected.
- Lockable chambers' covers to avoid vandalism and ensure proper management of the facility.
- Step iron/access ladders to be installed on the inside of the chamber wall to facilitate access of the facilities inside.

2.4.5. Road Crossings

Road crossings have been designed as where pipe is to cross a tarmac road, a gravel road or a busy earth road, a steel pipe casing or a concrete pipe/ culvert is to be installed to protect the pipe and allow easy maintenance.

2.4.6. Proposed Pipelines

Table 2.1: Pipelines in Proposed System

Name	Size (mm)	Length (km)
Ikuu to Irugururu	250	11.8
Ikuu to Rubate	90	5.48
Rubate line	90	7.7
Ikawa line	110	9.11
Ikuu to Kagani Mixed	32	2.53
Ikuu to Achievers' Boys	32	4.44
Gacuuri Primary to Kanguru Primary	32	1.2
Chera Shopping Centre to Karari Primary	32	2.49
Kanyuru to Ngaani Primary	32	2.62
Chera Market to Ikawa Secondary	32	1.56
PCEA Ciamake to Kiamuchii Day School	32	2.94
Kamwati Stage to Kamuguongo Primary	32	3.88

2.5. Proposed Project Activities

The activities related to the proposed project have been classified into four distinct phases of project implementation, which are the planning phase, construction phase, operation phase, and decommissioning phase. Each of these phases has its specific set of activities and considerations, which will be discussed in detail in the following subsections of the report.

2.5.1. Planning Phase Activities

The main activities considered during this phase are fund mobilization, tendering services, site handover, handover of drawing and water work plans and site layout to the contractor.

2.5.2. Construction Phase Activities

The construction phase entails the following activities:

- Excavation will be required to expose the ground where the water supply lines and auxiliary infrastructure will be installed. This will typically be done using excavators and backhoes in conjunction with human labour as per the approved designs.
- Pipe Installation: The pipes will be laid in place according to the planned layout and the proposed designs.
- Jointing and Connection: Pipes will be joined together using appropriate fittings and connectors. This will involve techniques such as solvent welding for PVC pipes, heat fusion for HDPE pipes, soldering for copper pipes, or threading for steel pipes. Valves, hydrants, and other components will also be installed as required.
- Backfilling: the excavated trench will be backfilled with soil.
- Pressure Testing: the newly installed water supply lines will be pressure tested to ensure there are no leaks. This will involve pressurizing the system to a specified pressure and monitoring it for a period of time to verify that the pressure remains stable.
- Connection to Water Source: the water supply lines will be connected to the source of water, from the water mains within the existing system.

The contractor during this phase will establish a construction camp on-site to accommodate construction workers and store materials. The contractor will manage all site access and implement temporary measures such as barricades, screens, fencing, hoardings and planking footpaths as needed to ensure the safety of the public and others.

2.5.3. Operation Phase Activities

Upon completion, the facility is poised to provide a reliable and clean water source for domestic consumption. The management and operation of the system will be entrusted to the Nithi Water and Sanitation Company (NIWASCo), in accordance with the provisions of the Water Act 2016 and the policies set forth by WASREB.

Ensuring the ongoing effectiveness and sustainability of the water supply Project is of utmost importance. Active monitoring will be carried out to ensure compliance with local, national, and international environmental sustainability standards and best practices. Regular assessments will be conducted to ensure that the Project maintains the necessary standards and effectively fulfils its intended role. These periodic evaluations will also ensure that the water supply Project stays up-to-date with the latest advancements in water infrastructure technology, thus ensuring its continued alignment with evolving developments.

2.5.4. Decommissioning Phase Activities

The decommissioning of the water supply Project may be required under certain circumstances, such as a change in project goals, changes in climatic conditions, or a shift in government policies related to land and water use. In such cases, the structures that are affected will be demolished. Non-reusable materials from the demolition process will be sold to licensed scrap metal dealers.

During the closure of the project, all activities will be halted, and the built structures and fences will be demolished. The affected land will undergo restoration efforts, including the planting of appropriate indigenous trees and grass, to restore its natural state. This approach ensures the proper management of the project's conclusion and minimizes any potential negative environmental impacts.

2.5.5. Project Cost and Implementation Schedule

Based on the bill of quantities (BoQ) derived from the technical project design, the projected cost for project implementation, inclusive of auxiliary infrastructure (excluding the expenses related to the Environmental and Social Management & Monitoring Plan), is estimated at **182,919,780.56** Kenyan Shillings.

2.6. Raw Materials and Resources to be used.

The main raw materials to be used during the construction phase of the project include PVC pipes and HDPE pipes, fittings and connectors. Other components that shall be installed include valves and steel pipe casing or a concrete pipe/ culvert for road crossings. The source of energy for various construction activities such as soldering, heat fusion and threading shall be electricity from KPLC or a generator for back up. Construction works shall be done using excavators and backhoes in conjunction with human labour as per the approved designs.

3. BASELINE ENVIRONMENTAL CONDITIONS

3.1. Project Location

The proposed Project is located in Chuka and Igamba ng'ombe sub counties in Tharaka Nithi County, which is part of Kenya's wider central region. The county has 5 sub counties namely: Tharaka North, Tharaka South, Chuka, Igambang'ombe and Maara. Chuka town is on the eastern slopes of Mount Kenya, about 65 km south of Meru Town. The county is positioned between latitude 00° 07' and 00° 26' south south and has a total area of 2,609 km2. It is also located between longitudes 37°19' and 37°46' east. The county shares borders with the counties of Meru to the north and north east; Embu to the south and south west and Kitui to the east and south east.

The project area is located at Rubate market, Itugururu market and their environs. The main road passing through the project area is the Embu-Meru Highway. The primary economic activity in project areas is agriculture. Farmers plant tea and coffee in the higher areas of the county and sorghum, maize, green grams and millet in the low altitude areas.

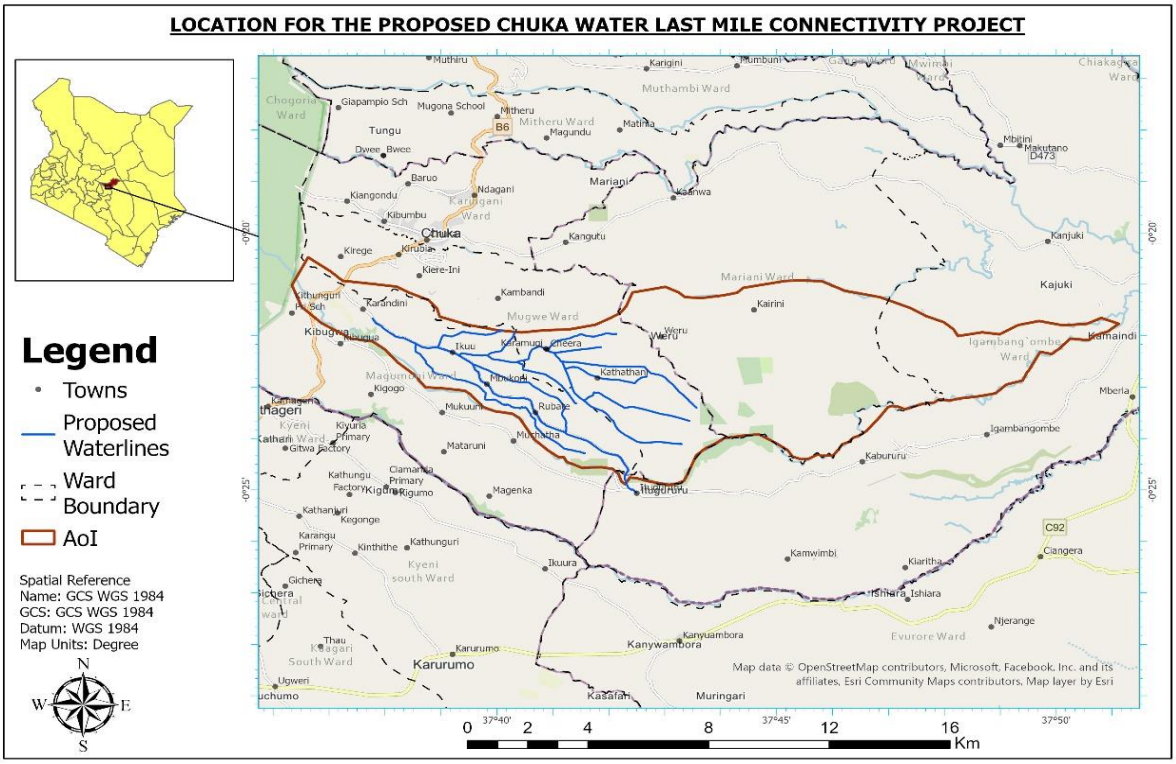

Figure 3.1: Location of the proposed project

3.2. Physical Environment

3.2.1. Physiography

Tharaka Nithi County exhibits a diverse physiography, with its highest altitude reaching 5,200 meters in the Chuka/Igambang'ombe and Maara areas in Mount Kenya, while the lowest altitude is 600 meters eastwards in Tharaka. The prominent physical feature of the county is the expansive 360 square kilometers of the Mt. Kenya Forest, spanning across Maara and Chuka/Igambang'ombe constituencies. This forest serves multiple purposes, acting as a vital catchment area for the Tana basin, and a critical source of resources such as wood fuel, fodder, and honey for the surrounding communities.

Notable hills within the landscape of the county include Kiera, Munuguni, and Njuguni in the Maara constituency, as well as Kijege, Gikingo, and Ntugi in the Tharaka. 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.

3.2.2. Land Use

The project area is in Chuka which is one of the major urban areas in Tharaka Nithi county. Agriculture is the main economic activity in the project area. Cash crops that are grown in the project area are mainly tea and bananas. In the low altitude zones areas, farmers grow food crops such as millet, sorghum and cassava due to the dry conditions. The area's unpredictable rainfall patterns have led to the cultivation of primarily short-term crops. To counter this challenge, some residents have embraced irrigation agriculture and have even set up greenhouses. Among the crops cultivated under irrigation are beans, tomatoes, pumpkins, various vegetables, and onions. The environment in the project area is also well-suited for livestock production, supporting a variety of animals such as, cattle, sheep, goats, and poultry. Figure 3.1 presents a land use/ land cover map for the project area.

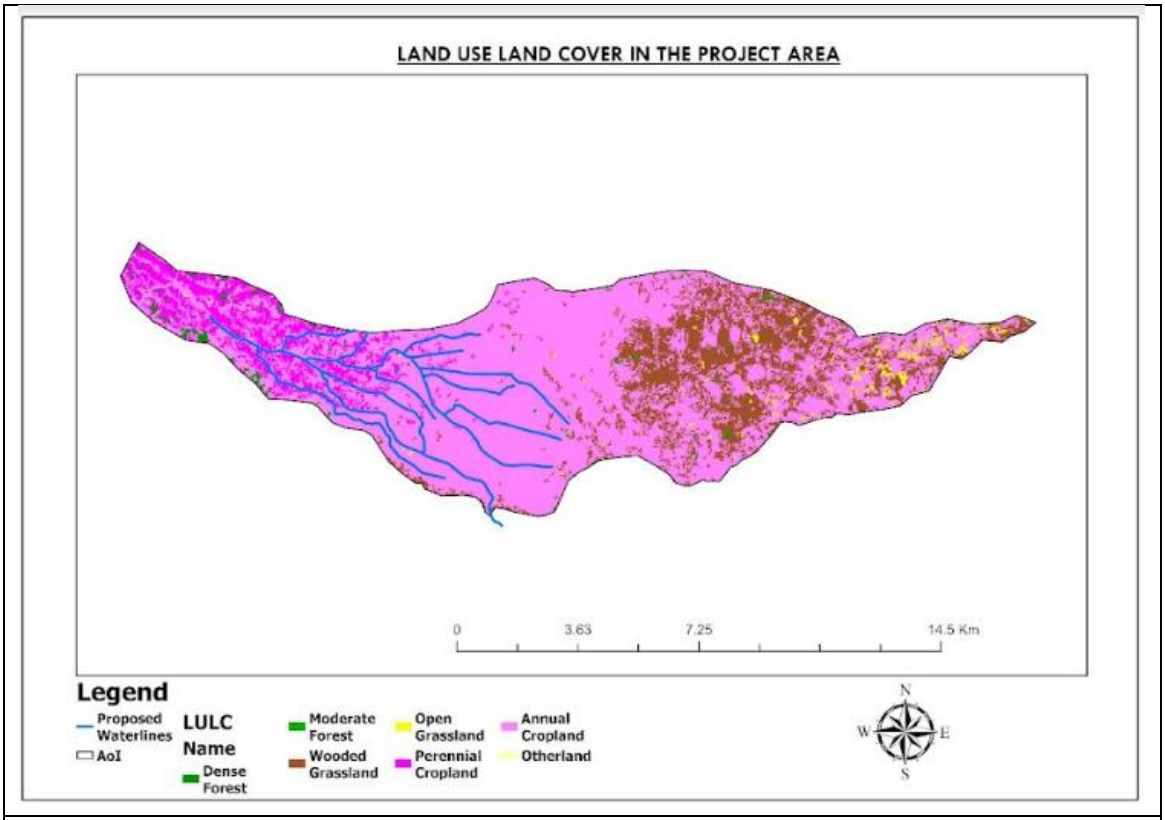

Figure 3.2: Land Use Land Cover Map

3.2.3. Topography

The topography of Chuka/Igambangombe Constituency is greatly influenced by the Mt Kenya volcanic activity creating 'V' shaped valleys within which the main tributaries of Tana River flow originating from Mt Kenya forest. The highest altitude of the County is 5200m a.s.l within the forest in Chuka/Igambangombe and Maara while the lowest is 600m a.s.l Eastwards in Tharaka.

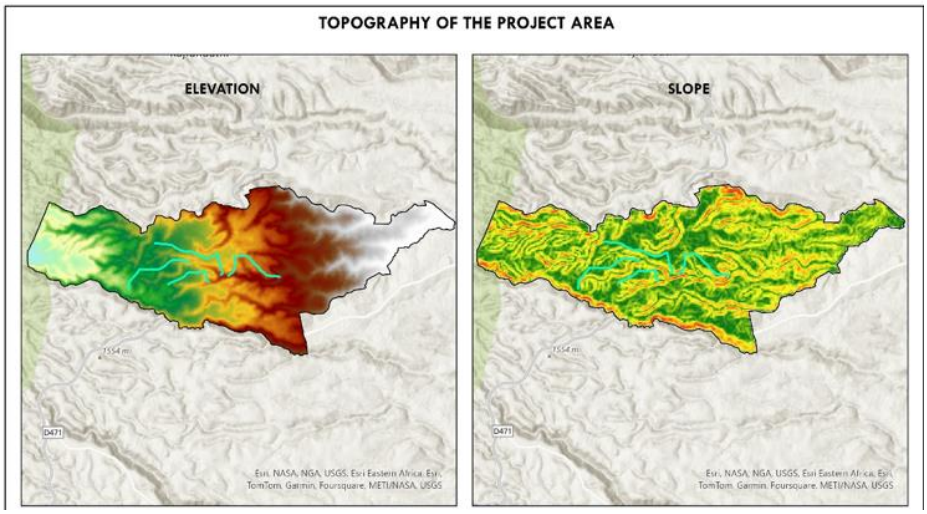

Figure 3.3: Topography map of the project area

3.2.4. Hydrology

- ***Ground Water Resources***

Largely due to the proximity of the region to Mt. Kenya, the source of all surface water draining the catchment, groundwater sources in the project area have not been extensively exploited. Shallow wells are the most prevalent category of ground water sources. They are found in homesteads in areas where the water table is high. Community water schemes in the area which provide raw water are the main source of water in areas not covered by the water service providers. They draw the water upstream ensuring that the systems are gravity fed. This negates the need to exploit ground water sources which could prove to be more expensive to initiate and operate. Figure 3 presents a photo of a shallow well spotted within the project area.

Figure 3.4: A shallow well spotted 10 meters from the wayleave

- ***Surface Water Resource***

The area's hydrology is highly influenced by the Mt. Kenya ecosystem. The project area is traversed by several rivers which originate from both the Mt. Kenya and Nyambere Hills, flowing Eastwards as tributaries of Tana River. These rivers include; Mutonga, Thingithu, Kathita, Thanantu, Thangatha, Kithinu and Ura River which provide water for Irrigation in the densely populated locations in parts of Tharaka and Chuka. Figure 3.5 and 3.6 shows photographs of rivers in the project areas.

Figure 3.5: River Manyanga, upstream of intakes works for Chuka Water Project

Figure 3.6: River Tungu

Figure 3.7 shows a hydrology map for the project area.

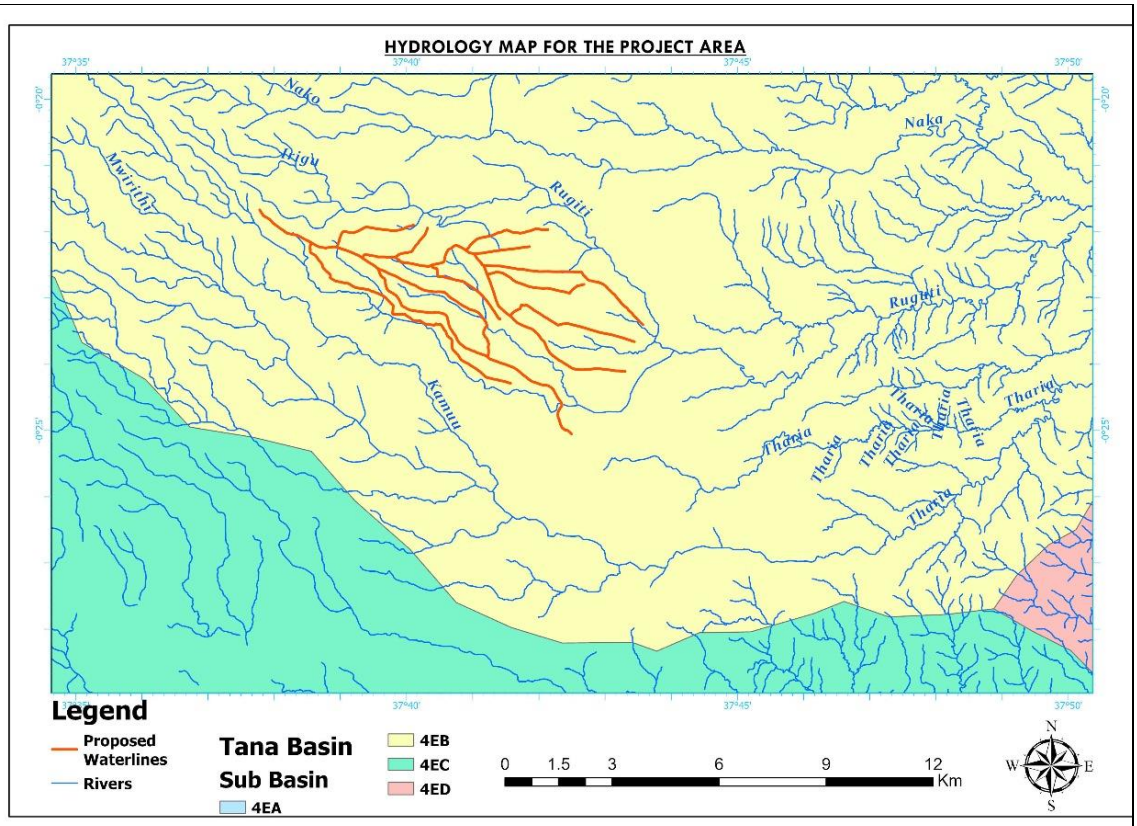

Figure 3.7: Hydrology Map

3.2.5. Drainage Pattern

The drainage pattern of Chuka is primarily dendritic, characterized by a network of interconnected rivers and streams flowing towards the Tana River basin. The 'V' shaped valleys created by volcanic activity contribute to the efficient drainage of water from the

highlands to the lowlands. The rivers and streams serve as essential water resources for various purposes, including irrigation, domestic use, and supporting local ecosystems.

3.2.6. Geology and Soils

Geology of the Project area is characterized by the volcanic eruption of Mt. Kenya; the Project area is generally underlain by the Precambrian Basement System which is covered by volcanic rocks and sediments from the eruption of Mt. Kenya. There is apparent water erosion during or after the ice age. The sediments from this erosion form a well-drained soil blanket along the "V" shaped valleys of the rivers. The geology is composed to a large extent of quaternary volcanic rocks, which are overlain by deep soils comprising of dark brown to grayish brown within the area as illustrated in the photograph below.

Figure 3.8: Alluvial soils within the project area

3.2.7. Flora and Fauna

Biodiversity of the Project location is highly influenced by the Mt. Kenya Forest Ecosystem with respect to indigenous plant cover species. However, due to human activities, the indigenous plant species have been displaced by exotic species that have also acquired economic values among the communities. Such plant species include tea, coffee, Eucalyptus spp, Cypress ssp., Caussurina spp. and Graveria SSP and wattle trees species. Other plant features include grass species, ferns, nippier grass, avocado, banana, yams (mainly in the river flood plains), cassava, sugar cane and arrowroots.

Human habitation and agricultural activities have significantly interfered with both terrestrial and aquatic habitats in the Project area. There is no terrestrial wildlife observed in the Project area since most land is under agricultural use for many years pushing the animals into the Mt. Kenya Forest. However, limited rodents like squirrels, moles and different bird species among others are found in the area. Among the aquatic species present include frogs, fresh water fishes found naturally in the rivers. Livestock keeping is significant with

dairy cows, sheep, goats, poultry and house pets (dogs and cats) also constituting part of the wider biodiversity.

3.2.8. Ecological and Climatic Conditions

The main Ecological zones within the county are: Upper Midland UM2, 3 and 4; Lower Midland 4 (LM 4), Lower Midland 5 (LM5), Intermediate Lowland Zone 5 (IL5); and Intermediate Lowland Zone 6 (IL6). The AEZ IL5 and IL6 cover the north-eastern and southern tip of the county; they are the driest agro-ecological zones.

Chuka is situated at the convergence of distinct ecological zones within County. The Highland areas of Maara and Igamang'ombe are categorized as Humid and characterized by substantial annual rainfall reaching up to 2300mm. This region serves as a significant water catchment area, contributing to the overall hydrology of the area. The topographical altitude significantly influences the distribution of rainfall, with higher elevations possibly impacting the variation and dispersion of rainfall due to orographic effects. Rainfall occurs in two distinct seasons: the long rains spanning from October to December and the short rains occurring between March and May. However, the distribution of rainfall is irregular and unpredictable in the lowland areas of the county.

Temperatures in the highland areas range between 14oC to 30oC while those of the lowland area range between 22oC to 36oC. Some areas in the lower region experience temperatures of up to 40oC especially during the dry season.

3.2.9. Flora and Fauna

Biodiversity of the Project location is highly influenced by the Mt. Kenya Forest Ecosystem with respect to indigenous plant cover species. However, due to human activities, the indigenous plant species have been displaced by exotic species that have also acquired economic values among the communities. Such plant species include tea, coffee, Eucalyptus spp, Cypress ssp., Caussurina spp. and Graveria SSP and wattle trees species. Other plant features include grass species, ferns, nippier grass, avocado, banana, yams (mainly in the river flood plains), cassava, sugar cane and arrowroots.

Human habitation and agricultural activities have significantly interfered with both terrestrial and aquatic habitats in the Project area. There is no terrestrial wildlife observed in the Project area since most land is under agricultural use for many years pushing the animals into the Mt. Kenya Forest. However, limited rodents like squirrels, moles and different bird species among others are found in the area. Among the aquatic species present include frogs, fresh water fishes found naturally in the rivers. Livestock keeping is significant with dairy cows, sheep, goats, poultry and house pets (dogs and cats) also constituting part of the wider biodiversity.

3.3. Socio-economic Environment

3.3.1. Population

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.

3.3.2. Administrative Structure

Tharaka Nithi County is divided into four (4) Administrative Sub Counties namely; Tharaka North, Tharaka South, Chuka/Igamba ngombe and Maara sub-Counties. Tharaka North Sub County is the largest covering an area of 803.4 Km2, followed by Tharaka South with 766.1 Km2. Chuka/Igamba ngombe is third in size with an area of 624.4 Km2 and Maara is the

smallest Sub County covering an area of 468.2 Km2. There are fifteen (15) Wards, sixty-three (63) Locations and one hundred and sixty-four (164) Sub-Locations in the County.

The proposed project is located in Chuka and Igamba ng'ombe sub counties in Karingani location which covers Chuka town.

3.3.3. Education

The education institutions in the area include primary schools, secondary schools, polytechnics and universities. Some of the Secondary Schools include Chuka Boys High, Chuka Girls High School, Ikuu Boys High School and Ikuu Girls High School. Institutions of higher learning include Rubate Teachers Training College and Chuka University. Photographs below shows some of the learning institutions project in the area.

Figure 3.9: Chuka High School

Figure 3.10: Chuka University near Chuka town, a few meters from the proposed project wayleave

3.3.4. Health Facilities

The County has a significant health facilities network run by Government, Religious Organizations, Community Based Organizations and Private Individuals. The health facilities include District Hospitals, Sub-District Hospitals and Health Centres, Dispensaries, Medical Clinics and other private facilities. Among the big hospitals include the Chuka District Hospital and Chuka Cottage Hospital.

3.3.5. Housing and Settlement Characteristics

The proposed project traverses both the urban and peri-urban area of Chuka in Karingani location. The settlement patterns are highly influenced by two major livelihood zones; farming zone in the peri-urban areas and business zone along the trading centers in urban areas. The urban area (Chuka town) is characterized by high rise buildings, institutions, trading and market centers which lack proper and approved physical development plans. This has led to poor urban development and probable rise of informal settlements. The peri-urban areas on the other hand are characterized by agricultural activities and stand-alone settlements since the land tenure in the area is private.

3.3.6. Economic Activities

Chuka urban center, the project area, is the largest town in Tharaka-Nithi County. The road network is well developed within the town center and its environs. The Ndagani area in the outskirts of Chuka Town is also fast urbanizing catalyzed by the growth of Chuka University with numerous commercial and residential developments. Chuka Town has several banks namely Co-operative Bank, Post Bank, Equity Bank, Kenya Commercial Bank, K-Rep Bank and Barclays Bank and other microfinance institutions. Chuka is a predominantly agricultural area with approximately 80% of the population engaged in agricultural activities in growing of tea, coffee, maize, beans, bananas, *sukuma wiki* under micro irrigation, cowpeas, cabbages, etc. The industries in the area mainly include tea factories with Weru Tea Factory being closest to the project area. Milk processing industries are also in the area since livestock keeping is one of the economic activities in peri urban areas.

3.3.7. Energy Access, Water Supply and Sanitation Access

Chuka area has a reliable connectivity to the electrical power grid from the Kenya Power and Lighting Company, ensuring all residences and institutions within the town are effectively linked to the national grid. While many establishments rely on traditional grid electricity, a number have embraced solar energy systems as a backup power source, while others utilize diesel-driven generators.

In terms of cooking fuel, the predominant sources include fuelwood, charcoal, petroleum gas, and electricity, with only a minority of residents opting for biogas. The provision of street lighting along access paths is comprehensive, contributing significantly to residents' sense of security and overall safety within the area.

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

The community water supply schemes are funded and built by community groups assisted by NGOs and the County Government. The community schemes run parallel to NIWASCO networks and extend to rural areas beyond NIWASCO's network. including Magumoni, Mwonge Range, Chuka University, Nthambo and Ndigia.

Regarding sanitation, the community members have access sewerage services from the NIWASCO within the urban areas. In areas outside the town the residents an ample number of toilets, which have been established through private endeavours. some financially stable residents have adopted the use of biodigesters and septic tanks within the residential areas as a means of managing wastes.

3.3.8. Sensitive Receptors in the Project Area

The project area is within close range to human settlements and institutions such as primary schools, secondary schools and a public university. The institutions near the project areas shall be notified by the Contractor at least 5 days before construction is due to commence in their vicinity. Figure 3.11 shows a land use map of the project area showing sensitive receptors i.e health and educational institutions.

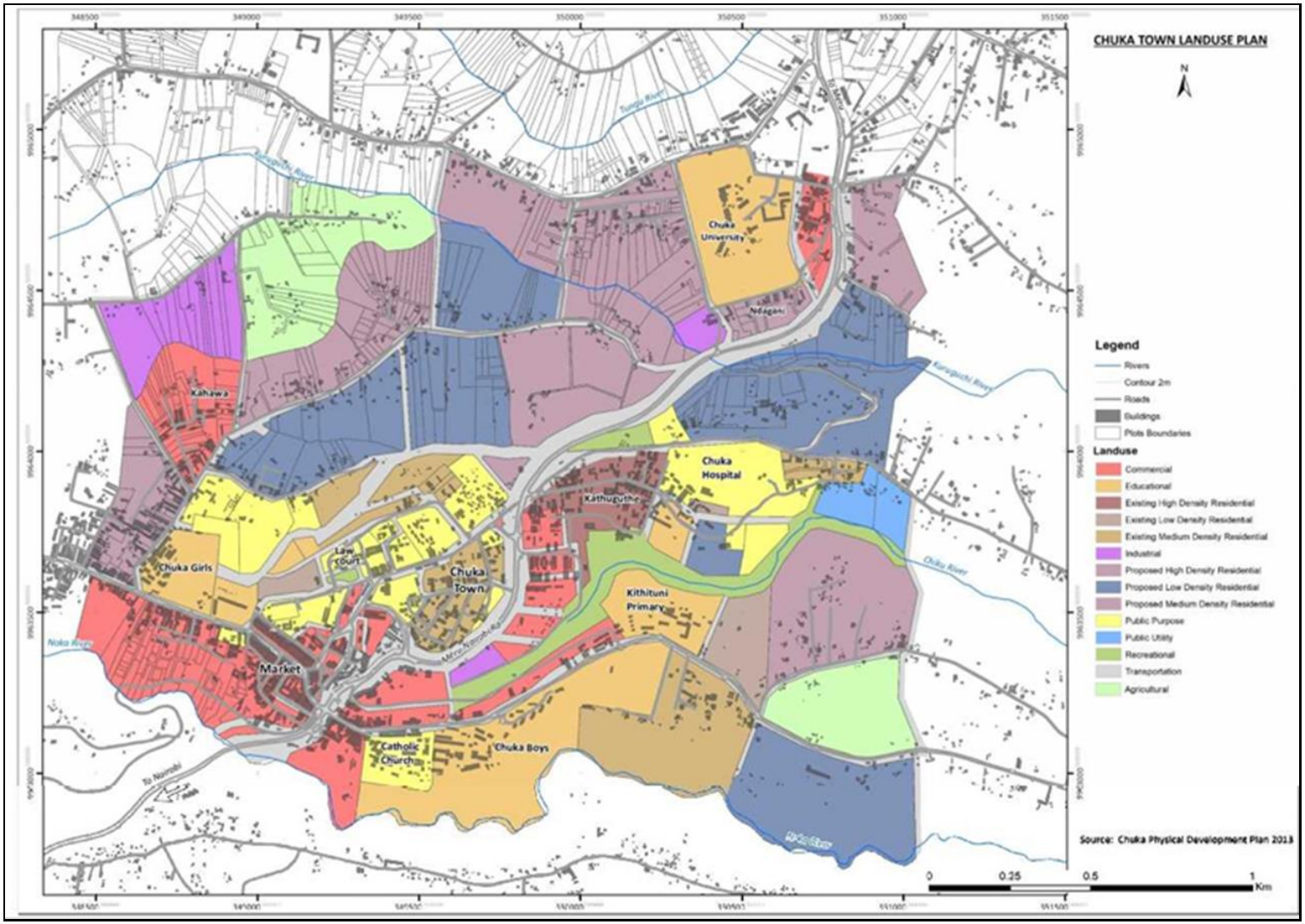

Figure 3.11: A map showing institutions (sensitive receptors) in the project area

3.3.9. Waste Management and Sanitation Facilities

Solid waste management in the urban areas of Chuka town is managed by the municipal council whereby they correct all solid wastes and dispose them in a dumpsite in the area which is managed by the municipal council. Plans are reportedly underway to get a landfill to serve the entire Chuka town. Regarding liquid waste disposal in the urban areas, most residents use septic tanks since the entire town is yet to be served by a sewerage system. In peri-urban areas solid waste management is localized and managed in individual homes and most households also use septic tanks for liquid waste disposal as shown in Table 3.1 below.

Table 3.1: Sanitation Facilities used by PAPs

Sanitation facility used by Households	Percentage
Pit Latrine	18.3
Sock Pit/ Septic Tank	81.7
Total	100

3.3.10. Water Sources in the Project Area

81.7% of households had their water connection from the local Water Service Provider, NIWASCO while 18.3% relied on boreholes. This analysis is presented in Table 3.2 below.

Table 3.2: Main Source of Water

Main source of water for the household	Percentage
Water Service Provider	81.7
Boreholes	18.3
Total	100

3.3.11. Accessibility of Social Structures

The project area is easily accessible and characterized by well-maintained road, health institutions and schools. Chuka urban center is the largest town in Tharaka-Nithi County. The road network is well developed within the town center and its environs. The Ndagani area in the outskirts of Chuka Town is also fast urbanizing catalyzed by the growth of Chuka University with numerous commercial and residential developments. Chuka Town has several banks namely Co-operative Bank, Post Bank, Equity Bank, Kenya Commercial Bank, K-Rep Bank and Barclays Bank and other microfinance institutions.

3.3.12. Transport and Communication

Chuka/Igambangombe Sub County is accessed by the Nairobi- Meru Highway (B6). This highway is the main access route for the County and the lager Meru region. There are other gravel roads that form the bulk of accessibility in the County. The roads are Chuka to Kaanwa to Kathwana which is a gravel road, Kibugua- Itugururu- gravel and B6-Rubate gravel road. There are minor earth /gravel

access roads within the region. Bitumen roads are limited to 32km of B6 along Meru-Nairobi highway from Katheri- Chuka Chogoria to Keria, 18km along Ishiara, Kathwana-Chiakariga Road (mate road) and (D471)1.2km to Kibugua. The road in which the proposed water infrastructure is to be constructed include: Nairobi- Meru Highway (B6), D471-Kibugua, part bitumen 1.2km (gravel), Kanwa (gravel), Rubate (gravel).

4. LEGAL, POLICY, REGULATORY AND INSTITUTIONAL FRAMEWORK

This section provides an in-depth analysis of relevant financial institution policies, national environmental regulations, strategic plans, legislation, and multilateral environmental agreements relevant to the proposed project. The chapter seeks to elucidate the impact of these framework on the proposed LMC for Chuka Water Supply project and highlight the imperative of alignment with these policies for its successful implementation and environmental sustainability.

4.1. The African Development Bank Integrated Safeguards System 2013

Aligned with the Bank's overarching commitment to fostering inclusive and environmentally sustainable growth over the long term, the Bank Group dedicates its operations to aiding Borrowers in conceiving and executing projects, initiatives, and other activities that prioritize environmental and social sustainability. Moreover, the Bank is steadfast in its dedication to bolstering the capacity of member countries and Borrowers to assess and manage the environmental and social risks and impacts associated with their endeavours (AfDB 2013).
In pursuit of this objective, 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

4.1.1. 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 these requirements by engaging registered and licensed experts to conduct a comprehensive 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 comprehensive Environmental and Social Management Plan to ensure that all the impacts of the projects are duly mitigated.

4.1.2. 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 LMC project for Chuka water supply Project has avoided involuntary resettlement by utilizing the road reserve. In addition, a Resettlement Action Plan (RAP) has been developed to address any potential impacts on Project Affected Persons (PAPs), ensuring adequate compensation if necessary.

4.1.3. 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.

4.1.4. 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).

4.1.5. 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

4.2. Relevant National Policies and Strategies

4.2.1. The Constitution of Kenya, 2010

The Constitution holds the highest legal authority in the nation and forms the foundation of Kenya's well-being. Its provisions are tailored to ensure the sustainable and productive management of land resources, the transparent and cost-effective administration of land, and the effective conservation and protection of ecologically sensitive areas.

Article 21 (3) outlines that all branches of government and public officials bear the responsibility of addressing the needs of vulnerable segments within society. This includes women, the elderly, persons with disabilities, children, youth, members of marginalized communities, and those from specific ethnic, religious, or cultural backgrounds.

Article 42 asserts the right of every individual to a clean and healthful environment, encompassing the following aspects:

- The safeguarding of the environment for the benefit of present and future generations through legislative measures and other strategies, particularly those detailed in article 69.
- The fulfilment of obligations concerning the environment as detailed under article 70. Section 69 specifies that the state shall:
- Promote public participation in environmental management, protection, and conservation.
- Institute mechanisms for environmental impact assessment, environmental auditing, and environmental monitoring.
- Eliminate processes and activities that pose potential harm to the environment.

It is anticipated that the guiding principles of Kenya's constitution with regard to environmental preservation and conservation will direct the construction and operation of the proposed Last Mile Connectivity of Chuka Bulk Water and the associated infrastructure. The project proponent will make earnest efforts to ensure that the rights of marginalized and vulnerable groups are duly considered in all project-related decisions. Through this Comprehensive Project Report and the Environmental and Social Management Plan (ESMP), the proponent has undertaken proactive measures to ensure that the project contributes positively to a clean and healthful environment for the community.

4.2.2. The Kenya Vision 2030

The Vision 2030 maps the development agenda by seeking to make Kenya a globally competitive middle- income country by 2030 (GoK 2012). Chapter 5 of the Vision 2030 blueprint focuses on education, health, water, environment, housing and urbanization amongst other sectors. Vision 2030 is being implemented through a series of five-year Medium- Term Plans (MTP). The MTP identifies the key policy actions and programs for each Ministry Department and Agency (MDA).

The overarching objective of the Environment, Water, and Sanitation Sector, as highlighted in the Vision, is to achieve a "clean, secure, and sustainable environment" by the year 2030. The planned development initiatives are focused on enhancing the water accessibility and overall health and hygiene conditions of the community. Furthermore, a dedicated Environmental and Social Impact Assessment for the LMC project has been undertaken to ensure effective mitigation of any potential negative environmental consequences that could arise from the project's execution.

4.2.3. The Sessional Paper No 1 on National Water Policy 2021

The Sessional Paper proposed a range of measures and actions through which Kenya can respond to the challenges facing the water sector. The Policy re-engineered the water sector through interventions that are geared towards achieving sustainable development in Kenya and in consonance with the sustainable Development Goals, 2030 (GoK 2021). The policy is geared to addressing the emerging challenges and realities in the sector more specifically addressing low sewerage coverage and supply of water resulting from rising population and expansion of economic activities across the sector.

This undertaking therefore conforms with the government policy as it aims to increase access to water to the residents of Chuka. The last mile connectivity of the chuka water supply project will give room for increased water supply coverage in chuka and its environs to improve the hygiene of the municipality. With the growing population in there is need to readjust water supply infrastructure to satisfy the needs of the town.

4.2.4. National Policy on Water Resources Management and Development (1999)

The Sessional paper No. 1 of 1999 was established with the objective of preserving, conserving and protecting available water resources and to ensure that water is allocated in a sustainable, rational and economic way. The policy further desires to provide water of good quality and in sufficient quantities that meets the various water needs while ensuring safe disposal of waste water and environmental protection. To achieve these goals, water provision through increased household connections and developing other resources and improved sanitation is required.

The planned Last mile Connectivity of the Chuka water supply is expected to yield benefits for huge town and urban area population, both directly and indirectly. The primary objective

of the proposed efforts is to improve the community's access to water hence improved sanitation and hygiene.

4.2.5. Sessional Paper No. 10 of 2014 on the National Environment Policy

The Republic of Kenya has a policy, legal and administrative framework for environmental management. This Policy sets out important provisions relating to the management of ecosystems and the sustainable use of natural resources. The policy further acknowledges that natural resources are under immense pressure from human activities particularly for critical ecosystems including forest, grasslands and arid and semi-arid lands.

The policy seeks to develop an integrated approach to environmental management, strengthening the legal and institutional framework for effective coordination, promoting environmental management tools. Under the National Environment Policy, the government will:

- Ensure optimal use of natural resources while improving environmental quality.
- Conserve natural resources such that the resources meet the needs of the present without jeopardizing future generations in enjoying the same.
- Develop awareness that inculcates environmental stewardship among the citizenship of the country.
- Integrate environmental conservation and socio-economic aspects in the development process.
- Ensure that national environmental goals contribute to international obligations on environmental management and social integrity
- Ensure Strategic Environment Assessment (SEA), Environmental Impact Assessment, Social Impact Assessment and Public participation in the planning and approval of infrastructural projects.
- Develop and implement environmentally-friendly national infrastructural development strategy and action plan.
- Ensure that periodic Environmental Audits are carried out for all infrastructural projects

To achieve this, it is a policy direction that appropriate reviews and evaluations the proposed LMC of Chuka water supply and operations are checked to ensure compliance with the environmental policy. The ESIA process ensure that conservation strategies are laid down in the in the critical decision points of the project.

4.2.6. National Environmental Sanitation and Hygiene Policy, 2016

The National Environmental Sanitation and Hygiene Policy is dedicated to addressing environmental sanitation and hygiene matters in Kenya, serving as a significant contribution to enhancing the dignity, health, welfare, social well-being, and overall prosperity of all residents in the country. The (Kenya environmental Sanitation and Hygiene Policy

2016)acknowledges that the foundation of healthy and hygienic behaviors and practices originates at the individual level.

The proposed last mile connectivity of the Chuka water supply project is in harmony with the policy's objectives to bolster sanitation, hygiene, the utilization of safe drinking water, and effective wastewater management at the household level. In accordance with the fundamental human right to live with dignity in a clean and sanitary environment, every Kenyan should have the opportunity to do so.

The intended works are designed to actively contribute to the enhancement of water supply and sanitation within the Chuka town. The proposed development will strictly adhere to the hygienic and sanitation practices set forth in the policy.

4.2.7. Gender Policy, 2011

This Policy Framework aims at mainstreaming gender concerns in the national development process in order to improve the social, legal/civic, economic and cultural conditions of women, men, girls and boys in Kenya. The policy provides direction for setting priorities to ensure that all ministerial strategies and their performance frameworks integrate gender equality objectives and indicators and identify actions for tackling inequality. In addition, each program will develop integrated gender equality strategies at the initiative level in priority areas. Within selected interventions, the policy will also scale-up specific initiatives to advance gender equality.

This policy will be referred to during project implementation especially during hiring of staff to be involved in the implementation of the project. Moreover, the project will be of benefit to women and girls by providing opportunities to reduce poverty and food insecurity among the rural poor households by improving the performance of irrigation and marketing infrastructure, as well as enhanced methods of post-harvest management.

The proponent through this ESIA has carried out adequate social assessment of the project and through the ESMP provided adequate measures to comply with the provisions of this legislations on; national legal and policy provisions on gender, HIV/AIDS and Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA).

4.2.8. National Climate Change Response Strategy, 2010

The strategy paper recognizes that Kenya is a water scarce Country and offers a variety of strategies for ensuring that the resource is utilized in ways that recognize that it is a finite resource. The paper also argues that interventions in the water sector should take a participatory approach involving different water users including gender groups, socioeconomic groups, planners and policy makers in water resource management (Kenya, 2010). These principles will also apply to the proposed project.

4.2.9. HIV and AIDS Prevention and Control Act 2011

The object and purpose of this Act is to (a) promote public awareness about the causes, modes of transmission, consequences, means of prevention and control of HIV and AIDS; (b) extend to every person suspected or known to be infected with HIV and AIDS full protection of his human rights and civil liberties. The Act provisions will be applied during Project implementation phase where the contractor will be required to create awareness among workers and community at large.

4.2.10 Sexual Offences Act, 2006

An Act of Parliament that makes provision about sexual offences aims at prevention and the protection of all persons from harm from unlawful sexual acts, and for connected purposes. Section 15, 17 and 18 focuses mainly focused on sexual offenses on minor (children).

4.2.11 Child Rights Act, 2014

This Act of Parliament makes provision for parental responsibility, fostering, adoption, custody, maintenance, guardianship, care and protection of children. It also makes provision for the administration of children's institutions, gives effect to the principles of the Convention on the Rights of the Child and the African Charter on the Rights and Welfare of the Child. The contractor under this Project will be required to comply to provisions of the Act during Project implementation.

4.2.12 Labour Relations Act, 2012

An Act of Parliament to consolidate the law relating to trade unions and trade disputes, to provide for the registration, regulation, management and democratization of trade unions and employers organizations or federations, to promote sound labour relations through the protection and promotion of freedom of association. This act will be applied by labour force on site in addressing disputes related to working conditions.

4.3. Relevant Legislative Framework

There are several legal provisions on environmental protection, which touch on and regulate the development of infrastructure like the proposed Last Mile Connectivity of Chuka water supply project. A brief review of the various legislations relevant to the development is given hereunder.

4.3.1. Environmental Management and Coordination Act CAP 387 and EMCA Amendments 2015

The Environmental Management and Coordination Act (EMCA) of Cap 387 was enacted to provide an appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto. EMCA does not repeal the sectoral legislation but seeks to coordinate the activities of the various institutions tasked to regulate the various sectors. These institutions are referred to as Lead Agencies in

EMCA. Lead Agencies are defined in Section 2 as any government ministry, department, parastatals, and State Corporation or local authority in which any law vests functions of control or management of any element of the environment or natural resource.

EMCA Cap 387 applies to all policies, plans and programs as specified in part IV, part V and the Second Schedule of the Act. A number of legislations are in place to ensure the provision of a healthy and clean environment but EMCA Cap 387 takes precedence. It is the principal law that governs the use, management and regulation of environmental resources in Kenya.

Under the second schedule, amended via (Legal Notice 31 & 32 of 2019 on EIA 2019), the proposed project is categorized as a Medium Risk Project. However, based on the advice by the authority the magnitude of works is have guaranteed development of a Project Report This Comprehensive Project Report (CPR) has been prepared for submission pursuant to Regulation 7 (4) of the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019. The assessment was conducted following recommendation under sub regulation 3 (a). Below is a highlight of key regulations under EMCA, Cap 387.

4.3.2. ESIA and EA regulations (EIA regulations 2003)

The regulations specify the necessary steps and guidelines for conducting an EIA and Environmental Audit, covering various aspects of environmental assessment and mitigation measures. The ultimate goal is to ensure the submission of a comprehensive report to NEMA, thus contributing to effective environmental management and compliance with regulatory frameworks.

The regulations further stipulate that a qualified expert(s) should prepare a report based on the assessment and audit, which must be submitted to the National Environmental Management Authority (NEMA). This ensures compliance with the regulatory requirements and facilitates the appropriate management of environmental impacts.

The ESIA process was conducted in accordance with the regulations, involving qualified experts and following the guidance provided by NEMA. The proponent is dedicated to adhering to the environmental management plan specified in the ESIA report, ensuring responsible environmental practices and the effective management of potential impacts.

4.3.3. Environmental Management and Coordination (Environmental Impact Assessment and Audit) Regulations, 2003 (amended 2019)

These regulations stipulate the steps to be followed when undertaking an Environmental Impact Assessment, and Environmental Audit. The regulations stipulate the ways in which environment impact assessment and audits should be conducted. The regulations require that the Environmental Impact Assessment and Environmental Audit be conducted in accordance with the issues and general guidelines spelled out in the second and third schedules of the regulations. These include coverage of the issues on schedule 2 (ecological, social, landscape, land use, and water considerations) and general guidelines on schedule 3 (impacts and their

sources, sub-projects details, national legislation, mitigation measures, a management plan, and environmental auditing schedules and procedures. In the second schedule amended in 2019, the project is classified as a low-risk project. It finally states that a project report, drawn by a qualified expert(s) should then be filed to the National Environmental Management Authority (NEMA).

In carrying out the ESIA and writing the report the requirements of this regulations and those of the international Social Safeguards were integrated and followed throughout the process. The proponent did the screening and scoping then as advised by the NEMA office commissioned a comprehensive ESIA study. The proponent shall observe the guidelines as set out in the environmental management plan laid out in the ESIA report as well as the recommendation provided for mitigation, minimization, and avoidance of adverse impacts arising from the project activities.

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

Water Quality Regulations apply to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources. The effective enforcement of the water quality regulations will lead to a marked reduction of water-borne diseases and hence a reduction in the health budget. The regulations also provide guidelines and standards for the discharge of poisons, toxins, noxious, radioactive waste or other pollutants into the aquatic environment in line with the Schedule of the regulations. The regulations have standards for discharge of effluent and sewer into aquatic environment. While it is the responsibility of the sewerage service providers to regulate discharges into sewer lines based on the given specifications, NEMA regulates discharge of all effluent into the aquatic environment. Everyone is required to refrain from any actions, which directly or indirectly cause water pollution, whether or not the water resource was polluted before the enactment of the Environmental Management and Coordination Act (EMCA Cap 387).

4.3.5. Environmental Management and Coordination (Waste Management) Regulations, 2006

These regulations stipulate how the different types of waste streams should be stored, transported, and disposed of. The type of waste streams described herein include solid waste, industrial waste, hazardous waste, pesticides and toxic substances, biomedical waste and radioactive substances. The regulations also stipulate the conditions for licensing any person dealing with the transport or waste disposal. The regulations prohibit anyone from disposing of any waste on any part of the environment except in designated waste receptacle or facility provided by the relevant local authority which may be legitimate dumpsites or landfills.

Since the proposed works will generate waste in form of waste soils during construction, human waste during operation and other solid wastes this act provides for the waste generator to be responsible for the collection, segregation at source and proper disposal of their wastes. Through the ESMP the proponent has provided measures for managing waste generated through this sub project. The proponent will comply with the provisions of EMCA in managing wastes as stipulated under waste management regulations by offering proper guidelines in waste management.

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

These regulations prohibit any person from 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. It also stipulates the factors to be considered when determining the amount of noise produced from various sources. The regulations further provide the permissible noise levels within different neighborhoods at different times. In determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered:

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

The regulations give permissible noise levels for silent zones, places of worship, residential (indoor/outdoor), mixed residential; and commercial.

4.3.7. Environmental Management and Coordination (Air Quality) Regulations, 2014

These regulations provide for the prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It applies to all internal combustion engines, all premises, places, processes, operations, or works to which the provisions of the Act and Regulations made thereunder apply, and any other appliance or activity that the Cabinet Secretary may by order in the Gazette, specify. They stipulate the measures to prevent air pollution from both stationary and mobile phases. They also provide for the permissible occupational exposure limits.

The proponent will ensure that ambient air quality is maintained during the during the project life cycle. The proposed works will ensure compliance with Air quality regulations by enforcing all the proposed preventive and mitigation measures in the ESMP.

4.3.8. Water Act, 2016

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 desilting and expansion of the water pan.

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

4.3.9. Land Act, 2012 (The Land Laws (Amendment) Act, 2016 No. 28 of 2016)

This is an Act of Parliament to give effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land- based resources, and for connected purposes. Part VIII of this Act provides procedures for compulsory acquisition of interests in land. Section 111 States that if land is acquired compulsorily under this Act, just compensation shall be paid promptly in full to all persons whose interests in the land have been determined.

The Act also provides for settlement programs. Any dispute arising out of any matter provided for under this Act may be referred to the Land and Environment Court for determination. Under section 3. (1) the Act applies to all land declared as— (a) public land under Article 62 of the Constitution; (b)private land under Article 64 of the Constitution; and (c) community land under Article 63 of the Constitution and any other written law relating to community land. In section 8(d) the Commission on behalf of the National or County Government may require the land to be used for specified purposes and subject to such conditions, covenants, encumbrances or reservations as are specified in the relevant order or other instrument.

The proposed LMC for the Chuka water supply project shall fully utilise the road reserves to minimise any form of livelihood displacement. The project proponents have made necessary arrangement for a Resettlement Action Plan in case there are instances of loss of livelihood through land. This has been undertaken in regards also to the requirements of the AfDB Integrated Safeguards Policies.

4.3.10. Occupational Safety and Health Act (OSHA 2007)

Occupational Safety and Health Act applies to all workplaces where any person is at work, whether temporarily or permanently. The purpose of the Act is to secure the safety, health and welfare of persons at work and protect persons other than persons at work against risks to safety and health arising out of the activities of persons at work. Section 19 of the Act

provides that an occupier of any premises likely to emit poisonous, harmful, injurious or offensive substances, into the atmosphere shall use the best practicable means to prevent such emissions into the atmosphere and render harmless and inoffensive the substances which may be emitted. This Act was found relevant for reference in this ESIA since the construction phase will involve workers who will be exposed to various occupational hazards.

There will be the need to ensure that all employees and people around the area are protected against any risks that could arise from the operations, hence the provisions of this Act will be incorporated. A comprehensive occupational health and safety audits will be carried out periodically to ensure compliance with this Act particularly in the construction phase.

4.3.11. The Public Health Act (Cap. 242) Revised 2012

Section 115 of the Act states that no person/institution shall cause a nuisance or condition liable to be injurious or dangerous to human health. The law requires that all lawful, necessary, and reasonably practicable measures be taken to maintain areas under jurisdiction clean and sanitary to prevent the occurrence of nuisance or condition liable for injurious or dangerous to human health.

Section 136 state that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitate the breeding or multiplication of pest shall be deemed nuisances and to be dealt with in the manner provided by this Act.

4.3.12. County Governments Act, 2012

This is an Act of parliament to give effect to Chapter Eleven of the Kenyan Constitution; to provide for the County government's powers, functions and responsibilities to deliver services and for connected purposes. The Act lays emphasis on the need for a consultative and participatory approach where the principles of planning and development facilitation in a county serve as a basis for engagement between the county government and the citizens and other stakeholders. Specifically, Part VIII of the Act outlines the principles of citizen participation in counties as;

- Timely access to information, data, documents, and other information relevant or related to policy formulation and implementation;
- Reasonable access to the process of formulating and implementing policies, laws, and regulations, including the approval of development proposals, sub-projects, and budgets, the granting of permits and the establishment of specific performance standards;
- Protection and promotion of the interest and rights of minorities, marginalized groups and communities and their access to relevant information;
- legal standing to interested or affected persons, organizations, and where pertinent, communities, to appeal from or, review decisions, or redress grievances, with particular emphasis on persons and traditionally marginalized communities, including women, the youth, and disadvantaged communities;

- Reasonable balance in the roles and obligations of county governments and non-state actors in decision-making processes to promote shared responsibility and partnership, and to provide complementary authority and oversight;

The Proponent has complied with the outlined principle of citizen participation and those of other stakeholders through the planning, screening, designing and ESIA process.

4.3.13. National Gender and Equality Act, 2011

National Gender Equality Commission is a constitutional Commission established by an Act of Parliament in August 2011, as a successor commission to the Kenya National Human Rights and Equality Commission pursuant to Article 59 of the Constitution. NGEC derives its mandate from Articles 27, 43, and Chapter Fifteen of the Constitution; and section 8 of NGEC Act (Cap. 15) of 2011, with the objectives of promoting gender equality and freedom from discrimination.

Gender mainstreaming in development endeavours guarantees that both the interests of women and men are fully integrated into every facet of the project's design, execution, operation, and subsequent monitoring and evaluation processes. This approach ensures equitable benefits for both genders, while simultaneously working to prevent the perpetuation of any existing inequalities.

4.3.14. Employment Act, 2007

The Act is enacted to consolidate the law relating to trade unions and trade disputes, to provide for the registration, regulation, management and democratization of trade unions and employers organizations and federations. The purpose of the Act is to promote sound labour relations through freedom of association, the encouragement of effective collective bargaining and promotion of orderly and expeditious dispute for the protection and promotion of settlements conducive to social justice and economic development for connected purposes. This Act is important since it provides for an employer employee relationship that is important for the execution of the project.

The Proponent through the Contractor will make sure that fairness and gender equity are followed during the recruitment of the labour force to be used during the construction phase.

4.4. International Conventions and Multilateral Environmental Agreements that Kenya is a Signatory

Kenya subscribes to some of the international laws and agreements on environmental management. As such, the consultant reviewed the following relevant international conventions and treaties which must be complied with during project implementation.

4.4.1. United Nations Convention to Combat Desertification

The objective of the United Nations Convention to Combat Desertification (UNCCD) is to combat desertification and to mitigate the effects of drought in seriously affected countries, especially those in Africa. It seeks to achieve this objective through integrated approaches to development, supported by international cooperation and partnership arrangements, in the affected areas. It lays emphasis on long-term strategies that focus on improved productivity of land and the rehabilitation, conservation and sustainable management of land and water resources, leading to improved living conditions, in particular at the community level. The proposed project will adhere to the requirements of the UNCCD.

4.4.2. Convention on Biological Diversity

The Convention on Biological Diversity adopts a broad approach to conservation. It requires Parties to the Convention to adopt national strategies, plans and programs for the conservation of biological diversity, and to integrate the conservation and sustainable use of biological diversity into relevant sectoral and cross-sectoral plans, programs and policies. The proposed project is expected to interfere with biodiversity in the project area during construction phase. Adequate measures have been recommended to conserve biodiversity.

4.4.3. Ramsar Convention on Wetlands

This is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Ramsar Convention is the only global environmental treaty that deals with a particular ecosystem. The treaty was adopted in the Iranian city of Ramsar in 1971 and the Convention's member countries cover all geographic regions of the planet.

Unlike the other global environmental conventions, Ramsar is not affiliated with the United Nations system of Multilateral Environmental Agreements, but it works very closely with the other MEAs and is a full partner among the "biodiversity-related cluster" of treaties and agreements. The proposed project is not on a wetland but measures to conserve the environment have been taken into consideration in the project ESMP.

4.4.4. Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC)

The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change, which commits its Parties by setting internationally binding emission reduction targets.

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

Under the Convention, governments: gather and share information on greenhouse gas emissions, national policies and best practices launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries cooperate in preparing for adaptation to the impacts of climate change. The Convention entered into force on 21 March 1994. The proposed project will adhere to mitigation measures recommended in the project ESMP to reduce impacts of climate change.

4.5. Institutional Framework for Water and Sanitation Sector

Table 4.1: Institutional Framework for Water and Sanitation Sector

Institution	Roles
Ministry of Finance and National Treasury	The National Treasury and Planning was established under the Executive Order No. 1 of 2022 to oversee the Country's economic policy and public finance management and national and sectoral development planning. The Ministry's Vision is to provide leadership in economic and public financial management, and development planning for shared growth through formulation, implementation and monitoring of economic, financial and development policies. Among other roles, the ministry is in charge of formulation of national budget, public debt management, formulation and maintenance of government accounting standards, bilateral and multilateral financial relations, public procurement and disposal policy, public investment policy and oversight and development and enforcement of financial governance standards. Investment interventions by development agencies such as the African Development Bank are important in the achievement of national sectoral goals. Such investments are coordinated through the National Treasury and Planning.
Ministry of Water, Sanitation and Irrigation	The Ministry was established under Executive Order No. 1 of 2022 to, among other functions, develop water resources management policy and standards, develop water and sewerage services management policy, develop waste water treatment and disposal policy, carry out water quality and pollution control, conduct sanitation management and carry out management of public water schemes and community water projects. The development of water and sanitation systems under NUWaSSaP are in accordance with the mandate of the Ministry and are therefore coordinated by the Ministry on behalf of the Government of Kenya.
Water Services Regulatory Board (WASREB)	Established by Section 70(1) of the Water Act 2016 with the mandate to, among other things: determine, prescribe and monitor standards for the provision of water services and asset development for water service providers, evaluate and recommend water and sewerage tariffs for the county water service providers and approve the imposition of such

Institution	Roles
	standards in line with consumer protection standards and set license conditions for water services providers For sustainability purposes and for the purposes of consumer protection, water and sewerage tariffs are strictly regulated by the Board in accordance with the law. The tariffs to be imposed by TWWDA under the current project will therefore have to comply with WASREB guidelines
Tana Water Works Development Agency	Tana Water Works Development Agency is one of the agencies established under Section 65(1) of the Water Act 2016 with the mandate to; a. Undertake the development, maintenance and management of the national public water works within its area of jurisdiction; b. Operate the waterworks and provide water services as a water service provider, until such a time as responsibility for the operation and management of the waterworks are handed over to a county government, joint committee, authority of county governments or water services provider within whose area of jurisdiction or supply the waterworks is located; c. Provide reserve capacity for purposes of providing water services where pursuant to section 103, the Regulatory Board orders the transfer of water services functions from a defaulting water services provider to another licensee; d. Provide technical services and capacity building to such county governments and water services providers within its area as may be requested; and e. Provide to the Cabinet Secretary technical support in the discharge of his or her functions under the Constitution and this Act The agency is the implementing institution of the Chuka Water LMC project and shall be in charge of ensuring the full implementation of the ARAP. The agency may delegate some of the functions to the Water Services Provider as stipulated under the Act.
County Government	The CoK, 2010 created 47 County Governments. Schedule 4 of CoK provides for water and sanitation services as devolved functions. Section 77(1) of the Water Act mandates the county governments to establish water service providers for the purposes of provision and development of water service infrastructure and management of water services within the county. The Public Health Act requires county governments to enforce the use of sewerage systems whenever such systems are available.
Land Acquisition Tribunal	The tribunal was created by the Land Value (Amendment) Act 2019, Part VIIA and is mandated to hear and determine appeals from the decisions of the National Land Commission in matters relating to the process of compulsory acquisition of land
Environment and Land Court	The Court was established under the Environment and Land Court Act, 2011. The Act sought to give effect to Article 162(2)(b) of the Constitution; to establish a superior court to hear and determine disputes relating to the environment and the use and occupation of, and title to, land, and to make

Institution	Roles
	provision for its jurisdiction functions and powers, and for connected purposes. Since its establishment as an arm of the High Court of Kenya, the E&L Court has hastened the period within which environmental and land related matters are adjudicated in the country. Any PAP, therefore, who may not be satisfied under the GRM process proposed under this ARAP and may feel that their right to land or to a clean environment may be infringed would be at discretion to prosecute the matter under this Court.
National Environment Management Authority	The National Environment Management Authority, NEMA, was established under the Environmental Management and Coordination Act, 1999. The Act established the legal and institutional framework for the management of the environment and for the matters connected therewith and incidental thereto in Kenya. The object and purpose of NEMA under the Act is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies related to the environment. The Authority, under Section VI of the Act, is mandated to license any development initiative after an Environmental Impact Assessment is conducted in the prescribed format. The law also allows any citizen whose right to a clean and safe environment may be infringed to seek redress from the Authority. NEMA has administratively devolved its functions to county levels where the County Director of Environment receives and addresses all issues directed at the Authority
Water Resources Authority	Article 11(1) of the Water Act, 2016 establishes the Water Resources Authority with the mandate to; a. formulate and enforce standards, procedures and Regulations for the management and use of water resources and flood mitigation; b. regulate the management and use of water resources; c. enforce Regulations made under the Act; d. receive water permit applications for water abstraction, water use and recharge and determine, issue, vary water permits; and enforce the conditions of those permits; e. collect water permit fees and water use charges; f. determine and set permit and water use fees; g. provide information and advice to the Cabinet Secretary for formulation of policy on national water resource management, water storage and flood control strategies; h. coordinate with other regional, national and international bodies for the better regulation of the management and use of water resources; and i. advise the Cabinet Secretary generally on the management and use of water resources.

Institution	Roles
	Any water abstraction from either ground or surface water thus requires a permit from the Authority. The Authority has administratively devolved its functions at regional and county levels to effectively serve the population.
County Environment Committee	EMCA (Amendment) 2015, Section 29, establishes the County Environment Committee to perform the following functions: a. be responsible for the proper management of the environment within the county for which it is appointed; b. develop a county strategic environmental action plan every five years; and c. perform such additional functions as are prescribed by this Act or as may, from to time, be assigned by the Governor by notice in the Gazette.
NIWASCO	Water service providers (WSPs) are established in accordance with Article 77(1) of the Water Act and has the mandate to: (a) provide water services within the area specified in the license; and (b) develop county assets for water service provision. The water service providers manage and maintain, on a day-to-day basis, water and sewerage services in the designated areas and levy tariffs as approved by WASREB.

5. PUBLIC PARTICIPATION, STAKEHOLDER CONSULTATION AND GRIEVANCE REDRESS MECHANISM

5.1. Overview

In accordance with the provisions set forth in the Constitution of 2010, AfDB Operational Safeguards, the Environmental Management and Coordination Act (EMCA) of 1999, the Environmental (Impact and Audit) Regulations of 2003, and other relevant legal frameworks, the Government of Kenya places a strong emphasis on the active involvement of the public in decision-making processes. To fulfil the legal obligations, the public consultations for the proposed project were held. These consultations are designed to facilitate robust community engagement and gain a thorough understanding of the community's perspectives, needs, and preferences.

5.2. Stakeholder Engagement Plan

A Stakeholder Engagement Plan has been prepared separately 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:

I. To establish a systematic approach for stakeholder engagement throughout the project cycles
II. To identify key stakeholders that are affected by the proposed projects, their interests, concerns and influence in relation to project activities
III. 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
IV. Identify effective ways and methods to disseminate project information as per the needs of the stakeholders
V. 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
VI. 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 meetings and questionnaires.

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 amongst community members including beneficiaries of the proposed project, 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 Water Supply Project.

5.3. Public Consultation 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 Water Supply 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 Water Supply 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 discussions during these meetings focused on clarifying the expected impacts and potential benefits of the project. With the primary goal of fostering a comprehensive understanding among all stakeholders. To ensure a thorough record of the discussions and the resulting conclusions, a detailed account of the meeting's proceedings and outcomes has been included as an appendix to this report.

5.3.1. Public Consultation Questionnaires

The Environmental and Social Impact Assessment process involved the distribution of questionnaires to key stakeholders and members of the public. These structured questionnaires were designed to collect insights from respondents regarding environmental and socio-economic aspects. A total of 30 questionnaires were administered within the project area to gather relevant information. Samples of the completed questionnaires, acquired from respondents in the project area, have been included as part of this report for reference.

5.3.2. Key Informant Interviews

A series of key stakeholder interviews and consultations were undertaken on during the field work exercise. The purpose of these interactions was to establish a deeper and mutual comprehension of public concerns of the stakeholders, as well as to incorporate the valuable viewpoints of key stakeholders into this report.
The interviewed key stakeholders encompassed experts and administrators from diverse levels, including public administration, lead of MDA's within Tharaka Nithi, community members, managers of institutions, and business proprietors situated within the project site. These engagements were aimed at fostering a comprehensive understanding of perspectives

and integrating a variety of viewpoints into the reporting process. These stakeholders encompassed:

- TWWDA
- DCC
- ACCs
- County Government Officials
- Water Resources Authority
- Local Administration
- Public Health

5.4. Comments and Salient Issues from the Public

5.4.1. Opinion on Project implementation

The comprehensive data gathered from various sources, including Key Informant Interviews, meetings, and questionnaires, leaves no room for doubt: the last mile connectivity of the water supply Project will play a central and indispensable role in ensuring consistent access to clean water. This achievement, in turn, will have far-reaching effects on elevating, improving sanitation standards, and enhancing the overall quality of life for the community. The feedback received from all respondents speaks with a unified voice, underscoring their profound interest in the project. This collective sentiment highlights the project's critical importance to the Chuka community. Beyond the immediate benefits of water access, respondents also universally recognize the project's potential to positively impact the local economy. This recognition emphasizes its significant contribution to fostering sustainable livelihoods and promoting holistic community development.

5.4.2. Negative Impacts:

1. **Deforestation:** Tree cutting for pipeline construction may lead to deforestation.
2. **Air Pollution:** Construction activities could lead to increased dust and decline in air quality.
3. **Noise Pollution:** Construction noise from machinery and equipment may impact the area.
4. **Erosion of Indigenous Culture:** Migration could introduce new cultures, potentially eroding indigenous traditions.
5. **New Vices:** Economic development might introduce new social challenges like substance abuse, sexual abuse, gender-based violence.

5.4.3. Concerns and Issues from the Public Participation

Table5.2: Issues of Concern from the Public Participation and Responses given

Issue/Concern	Technical Team Response
Enquiry about compensation of the affected persons	Compensation for all persons that will be directly affected by the projects shall be done diligently following the Resettlement Action plan that shall be formulated by the consultant.

Issue/Concern	Technical Team Response
An inquiry whether the local labour force would be prioritized	In a bid to grow the economy of the project area, the contractor shall be keen on hiring locals, especially for unskilled labour.
Inquiry about the economic viability of his land parcel after a pipe line transvers somebody's land.	The community members were informed that they would still carry out agricultural activities on their land parcels after the pipelines were laid but would be limited to growing shallow-rooted crops such as maize and beans. No structures would be allowed along the line to allow for operational maintenance
Dust pollution during excavations	The contractor will ensure sprinkling of roads with water to mitigate against dust during project construction phase
Noise pollution from project vehicles and excavation activities	Contractor will restrict site activities during the day especially for sections requiring heavy use of machinery
Accidents	The proponent will put in place adequate safety measures to be adhered to by contractors and the workers during project implementation. Excavated trenches not to be left unattended
Cases of the pipeline passing through private land	It was confirmed that the proposed project will utilize the road reserve to minimize issues of compensation

5.4.4. Recommendations from the public participation

- **Employment of the local youth:** The community members made an appeal that the selected contractor to give precedence to hiring local youth whenever employment openings arise during the course of the project.
- **Site Safety:** Strict adherence to safety measures during construction to minimize accidents.
- **Quality of Works:** Ensure high construction standards for project success and prevention of potential issues.
- **Site Security:** Provide site security for critical infrastructure during and after construction to prevent vandalism and theft.

5.5. 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. Figure 5.1 presents the project grievance management procedure.

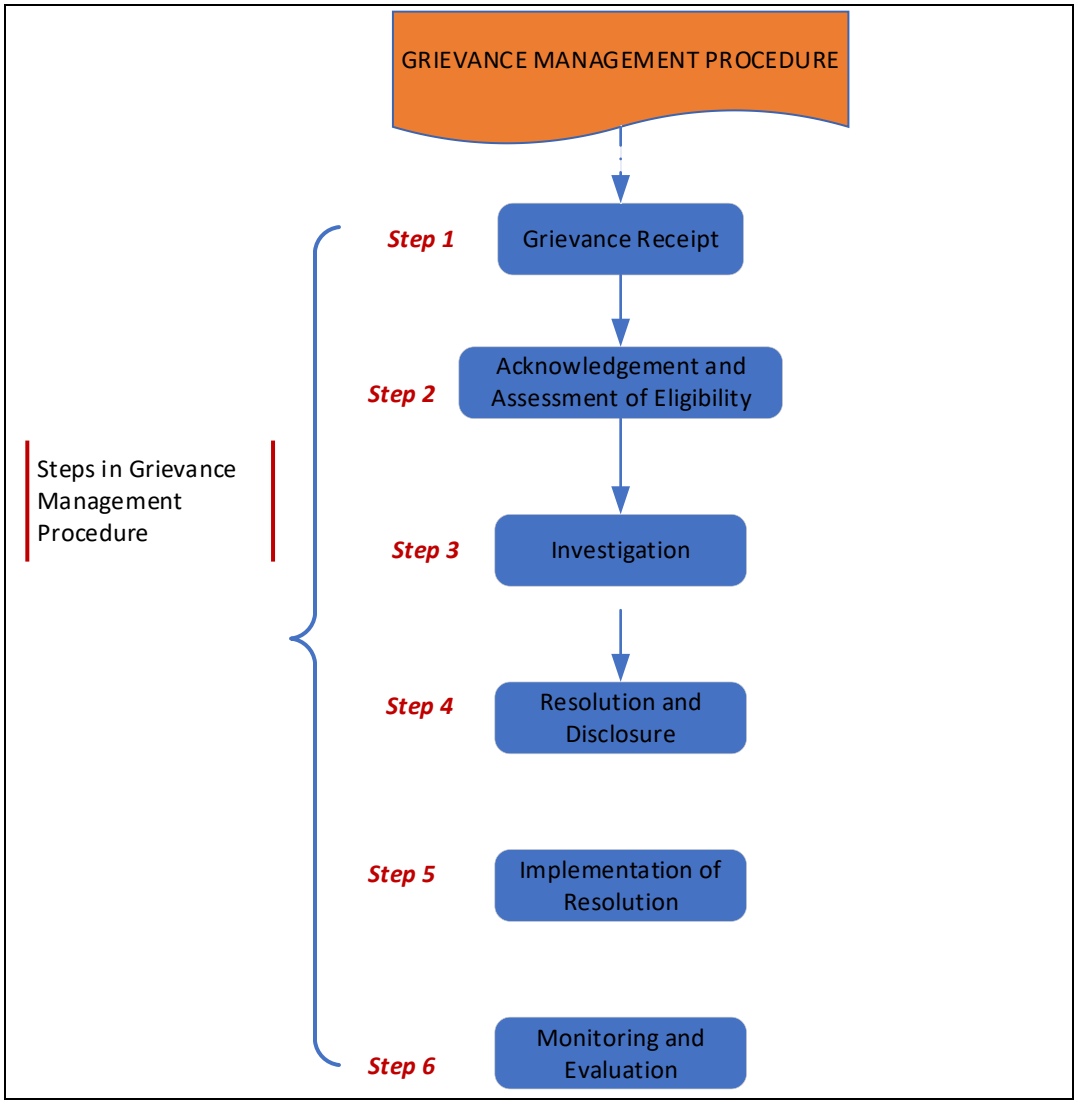

Figure 5.1: Grievance Management Procedure

Levels of Grievance Redress Mechanism

1) 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.2. The committee shall be trained by the Social Safeguard Officer on

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

conflict resolution, group dynamics, project sustainability among other areas that shall be deemed necessary.

2) Second Level of Redress: 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 social safeguard specialist, 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.

3) Third Level of Redress: National Level

A Grievance Handling Committee at national level shall be formed 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 coordinators 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 a grievance resolution 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 in this report.

The GRM tool have been attached in Annex 11.5 of this report.

5.6. Future Stakeholder Engagement Activities

Stakeholder engagement and public consultation will be a continuous activity in all project phases guided by the Stakeholder Engagement Plan. The next project activities that will necessitate stakeholder engagement are:

- Disclosure of the ESIA Report
- Compensation of Project Affected Persons (PAPs)
- Grievance management at various levels
- Project implementation activities
- Monitoring and Evaluation

6. ASSESMENT OF PROJECT ALTERNATIVES

As mandated by the authorities this section plays a critical role in determining the most appropriate development approach for the Chuka water supply project while minimizing adverse environmental impacts. To achieve this, an exhaustive analysis was conducted on a range of feasible land-use options. These options underwent rigorous assessment criteria, considering their environmental implications, community acceptance, economic viability (including land productivity), and feasibility in terms of design and execution.

6.1. "No-action" Alternative

The "No-action" alternative entails maintaining the current status quo of the water supply project in Chuka. This approach would ensure the preservation of the existing environment, including vegetation and ecosystems, without introducing any changes. The decision to select this alternative could be based on various principles:

- **Environmental Sensitivity**: If the site hosts threatened, rare, endangered, endemic, or keystone plant or animal species, or if it holds a designation for preservation under legislative acts.
- **Archaeological or Historical Significance**: If the site contains valuable historical or archaeological artifacts or holds substantial cultural importance.
- **Environmental Implications**: If implementing the project would lead to significant and adverse environmental impacts.

Opting for the "No-action" alternative would safeguard the environmental sensitivity of the site, its historical or archaeological value, and mitigate potential negative environmental consequences associated with the proposed project.

Thorough evaluation reveals that implementing the Last Mile Connectivity of the Chuka water supply project will not hinder or obstruct existing or future developments in the vicinity, including similar developments. The LMC is a continuation of the initial phases of the bulk water supply project, aiming to connect consumers to the water supply system.

There are no significant concerns regarding the physical, biological, cultural, and socio-economic attributes of the town or its vicinity. This implies that the project is not expected to exert adverse effects on crucial aspects related to the physical environment, biodiversity, cultural heritage, or local communities.

The "No-action" alternative would compromise access to safe and reliable water supply services for the people of Chuka. Residents within the municipality would continue to rely on inadequate water supply systems, leading to inefficiencies and potential health risks due to waterborne illnesses. Additionally, the continued pressure on existing water sources may compromise ecosystems downstream. Therefore, opting for the "No-action" alternative would not address the growing water supply needs of Chuka and may perpetuate existing challenges.

6.2. Alternative Technologies and Materials to the pipeline

The proposed the pipeline design approach integrated hydraulic principles, material selection, and operational considerations to create a robust and efficient water supply system tailored to the specific needs of the last mile connectivity to the Chuka water supply project. The key considerations were tailored to ensure efficient water conveyance of withstanding pressure at different gradients within the system, minimizing operational and maintenance costs while adhering to the environmental sustainability of the project.

Based on a comprehensive evaluation of materials and criteria, HDPE pipes were predominantly chosen for buried sections due to their cost-effectiveness, ease of handling and installation, durability, local availability, and resistance to corrosion. Steel pipes were selectively employed for specific sections, likely where higher pressure requirements or environmental conditions warranted their use.

Some analysis of other materials that could be used include:

1. UPVC (Unplasticized Polyvinyl Chloride) Pipes:

Similar to HDPE, UPVC pipes are cost-effective, easy to handle and install, durable, locally available, and resistant to corrosion. They offer excellent chemical resistance and are suitable for buried applications. However, the pipes may not be as flexible as HDPE, which could pose challenges in rocky or uneven terrain within the proposed project area considering the location of the mains and the treatment plant within Chuka. They may also be prone to cracking if exposed to extreme temperatures and pressure making it uneconomical on maintenance basis.

2. Ductile Iron Pipes:

Ductile iron pipes are highly durable and can withstand high pressure and external loads. They have a long lifespan and are suitable for buried applications in various soil conditions. The pipes are however heavier and more expensive than plastic pipes, which may increase transportation and installation costs. They are also susceptible to corrosion if not properly protected.

3. GRP (Glass Reinforced Plastic) Pipes:

GRP pipes are lightweight, corrosion-resistant, and have a smooth internal surface, reducing friction loss. They offer excellent strength-to-weight ratio and are suitable for buried applications in diverse environment as it is in Chuka. The pipes however may be more expensive than HDPE or UPVC pipes. Specialized equipment and expertise may be required for installation. This may in turn keep at bay the unskilled youths from Chuka considering the other piping systems require techniques that could be easily adopted by the residents who benefit from the project. The transportation of labour can increase upfront costs for the entire project.

4. PVC-O (Oriented PVC) Pipes:

The pipes combine the advantages of PVC and HDPE, offering increased strength, flexibility, and resistance to cracking. They are lightweight, easy to install, and have a long lifespan. The pipes may be relatively new in some markets, leading to limited availability and potentially higher costs compared to traditional PVC or HDPE pipes.

6.2.1. Summary

Based on the analysis of piping materials the HDPE with a combination of steel piped within exposed grounds is recommendable. The HDPE pipes offer durability, standing resilient against corrosion and rust, which makes them well-suited for buried applications within Chuka. where soil conditions might pose challenges. HDPE pipes are lightweight and flexible, facilitating easier transportation, handling, and installation compared to heavier alternatives like steel. Additionally, HDPE pipes are locally available, which streamlines procurement processes and supports local economies.

Environmental considerations also find the HDPE pipes favorable. Their recyclability and resistance to chemical leaching align with sustainability goals, minimizing environmental impact throughout their lifecycle. Furthermore, the pipes have versatility, capable of accommodating varying flow velocities and pressures without compromising performance of the system.

7. ANTICIPATED IMPACTS AND MITIGATION MEASURES

7.1. Introduction

This chapter presents an evaluation of potential challenges that may arise during the implementation of the proposed project. These impacts are classified according to their probability of occurrence and their consequences on the physical, biological, occupational, and socio-economic aspects of the environment.

7.2. Expected Positive Environmental and Social Impacts During the Construction Phase

1. **Job Creation**: the construction phase of the Last mile connectivity of Chuka Water Supply project will create employment opportunities for local laborers, engineers, water experts, technicians, and support staff. This influx of employment will stimulate economic growth in the area.
2. **Skills Development**: the proposed LMC Project for Chuka water is expected to provide training programs and skills transfer to local workers, providing them with valuable skills and experience that can be utilized beyond the project duration.
3. **Infrastructure Improvement**: The construction process will involve upgrading some roads and other infrastructure to facilitate transportation of materials and equipment to the specific sites. This will lead to long-term improvements in accessibility and connectivity for the community.
4. **Community Engagement**: as advised by the public consultation, the project will involve consultation with local communities, providing an opportunity for stakeholders to voice their concerns and contribute to the planning process. This will foster a sense of ownership and involvement in the project.
5. **Access to Water**: While the water supply system is being constructed, temporary water sources such as boreholes or tankers may be provided to ensure that residents have access to water throughout the construction period.
6. **Environmental Management**: Construction projects often include measures to minimize environmental impact, such as erosion control, waste management, and reforestation efforts. These measures can help protect local ecosystems and natural resources.
7. **Social Development**: Construction projects can contribute to social development by providing opportunities for community engagement, education, and capacity building. For example, health and safety training programs may be implemented to promote worker well-being.
8. **Economic Stimulus**: The influx of construction activity can stimulate local businesses, from suppliers of construction materials to restaurants and accommodation providers catering to workers and visitors.

7.3. Expected Negative Environmental and Social Impacts During the Construction Phase

7.3.1. Disturbance of Water Supply in the Locality

The Chuka Water Supply Project plays a vital role as a primary water source for both for residents within Chuka. The proposed LMC operations have the potential to disturb the

natural water flow within the system, which could lead to potential disruptions in the regular provision of water to the local community. In addition, the proposed LMC construction activities such as excavation might accidentally lead to pipe breakage of other water supply projects compromising water flows. Various measures to mitigate the impact include:

1. **Temporary Water Supply Alternatives**: Prior to construction, the project proponents and contractors should establish temporary alternative water supply sources for both residents and livestock. This may involve using water tankers to ensure a continuous water supply during the construction period. Keeping the borehole operational with a service tank in place can also be considered.
2. **Phased Construction**: To minimize the extent of disruption at any given time, the construction process can be divided into phases to limit the area of disturbance and allow certain portions of the water supply to remain unaffected.
3. **Scheduling and Timing**: Construction activities can be scheduled during wet seasons or when alternative water sources, such as rainwater harvesting, are available in the area.
4. **Restoration of the Water Supply systems**: The project proponent and contractors should put up measures to ensure any breakage is repaired within a specified time not more than 12 hours.

7.3.2. Traffic Congestion

Excavation, trenching, and installation of pipes, will disrupt traffic flow and require road closures, lane restrictions, or detours whenever works are by the road sides. Construction vehicles and equipment may occupy lanes or block access to roads, leading to congestion and delays for motorists. The construction crews may need to temporarily close roads or divert traffic to alternative routes to facilitate water line installation. These closures and diversions can reroute traffic onto already congested roads, increasing travel times and causing gridlock in surrounding areas.

Mitigation measures to address traffic congestion during the development shall include:

- Minimize disruption during peak travel times or major events can help reduce traffic congestion.
- Employ temporary traffic control measures including signage, and flagging operations to maintain traffic flow and minimize delays.
- Providing prior information to motorists about expected works and alternative routes that can help distribute traffic away from congested areas and reduce the impact on surrounding road networks.
- Engaging with the community and stakeholders through public outreach and communication campaigns can raise awareness about construction-related traffic impacts and encourage cooperation and understanding during the project.
- The contractor should collaborate with local transportation agencies and authorities to coordinate construction schedules, traffic management strategies, and public transit options to optimize traffic flow and minimize disruption to commuters and residents

7.3.3. Loss of Biodiversity

Chuka is situated at a critical juncture within a vital ecosystem near Mount Kenya. The proposed last mile connectivity efforts are geared towards enhancing the existing infrastructure by introducing new water supply facilities. The process of excavating for foundation laying, involving the construction of tanks, pipelines, auxiliary structures, and drainage systems, may potentially intersect with the existing vegetation, particularly indigenous trees. Habitat destruction and fragmentation associated with these activities can result in the loss of biodiversity and threaten the survival of local plant and animal species. This can have cascading effects on ecosystem functioning and resilience.

Mitigation measures

- Indigenous trees shall not be cut down
- Transportation of materials and wastes to be done through the existing local roads.
- Sensitization of the work-force on environmental conservation and ecological protection.
- Re-vegetation of cleared areas with indigenous vegetation species
- Selective removal of trees within the construction area,
- Minimizing land clearing and disturbance of habitats, where possible the contractor to exercise selective removal of mature, indigenous trees and vegetation

7.3.4. Noise and Vibrations

Various sources are anticipated to contribute to the generation of noise, including construction machinery and incoming vehicles delivering materials. The construction activities associated with the project are expected to result in a relatively minor noise impact due to their limited scale. While there might be occasional noise disturbances affecting site workers and a few local residents, measures can be implemented to control these noises within acceptable levels. The extent of the noise impact hinges on whether the project introduces new noise sources that elevate noise levels beyond the existing ambient conditions.

To manage potential noise impacts, the project will adopt the following mitigation measures:

1. **Scheduling**: Conduct noisy construction activities during daytime hours to minimize disruption to nearby residents.
2. **Equipment Selection**: Use noise-reducing construction equipment and machinery to lower noise emissions.
3. **Equipment Maintenance**: Regularly maintain and inspect construction equipment to prevent excessive noise due to mechanical issues.
4. **Idle Time Management**: Limit idling time for small equipment and encourage workers to turn off vehicle engines when not in use.
5. **Acoustic Enclosures**: Enclose noisy machinery in soundproof enclosures to contain noise emissions.
6. **Personal Protective Equipment**: Provide workers with earmuffs and other protective gear for noise reduction.

7. **Communication and Education**: Inform nearby residents and workers about construction activities and noise levels to manage expectations and reduce disruptions.
8. **Adherence to Regulations**: Comply with local noise regulations and guidelines to ensure noise levels remain within acceptable limits.

7.3.5. Air pollution

Potential sources of air pollution include dust, traffic; emission from machines and material supply vehicles. Movement of vehicles transporting materials such as fuel and other required construction materials and equipment during construction will lead to the generation of dust in the air. Large quantities of dust present a respiratory hazard, it may also cause visual intrusion hence presenting accident risks during the construction phase.

To mitigate emissions during the construction phase, the following measures will be implemented:

- All trucks hauling loose materials will be covered, or a minimum of two feet of freeboard will be required. This measure prevents the materials from being exposed and reduces the potential for dust generation during transportation.
- The project will be undertaken in phases to mitigate the cumulative effects of dust. By staggering the construction activities, the overall dust emissions can be reduced compared to completing the entire project at once.
- Suitable maintenance will be carried out on all machinery used during construction to prevent the emission of noxious gases.
- Drivers and machine operators will be instructed to avoid unnecessary running of motor vehicle engines and machinery when not in use.
- Wet Methods for Dust Suppression techniques on site such as water sprays and mists, will be employed.
- Provision of Personal Protective Equipment (PPE): Suitable PPE, such as nose masks, will be provided to workers and staff on-site to protect them from inhaling dust particles and ensure their safety.

7.3.6. Increased Water Demand

The construction activities more so the auxiliary infrastructure are expected to increase the need of water for construction purposes. Both the workers and the construction work will create additional demand for water in addition to the existing demand in the water scarce locality. Water will be mostly used in the creation of concrete for construction works and for wetting surfaces or cleaning completed structures. This would tend to disturb the general water supply in the entire supply Project.

Mitigation Measures

1. Sensitize the project staff and workers about responsible water use practices. Emphasize the importance of minimizing water wastage and avoiding unnecessary water consumption.
2. Implement systems to recycle and reuse water on-site. For instance, water used for cleaning equipment or surfaces can be collected and reused for similar purposes.
3. Explore the possibility of utilizing temporary water sources, such as rainwater harvesting or mobile water tanks, to meet the additional water demand. This can help reduce the strain on the existing water supply system.
4. The contractor to Install temporary water storage tanks on-specific sites to ensure a readily available supply of water for construction activities. These tanks can be filled during periods of adequate water availability and used when needed.
5. Plan construction activities to coincide with periods of higher water availability, such as during the rainy season. This will help reduce the demand on the existing water supply system.

7.3.7. Public Health and Safety

Just like the proposed LMC for Chuka Water Supply, construction activities inherently entail various health and safety hazards that necessitate careful attention and mitigation measures. These hazards arise from the dynamic and complex nature of construction work, involving the manipulation of heavy machinery, interaction with potentially hazardous materials, working at elevated heights, and exposure to various environmental conditions. Some of the hazards that may be encountered include: Heavy Machinery and Equipment, trips and fall Hazards, Hazardous Materials, Confined Spaces, Noise and Vibration, harsh weather conditions and unstable structures.

Mitigation Measures

- **Document and communicate the safe operating procedures to the workers**: this will involve creating detailed written instructions and guidelines that outline the specific steps, precautions, and best practices to be followed when carrying out a particular task or operation.
- **Safety Training and Orientation:** Provide comprehensive safety training and orientation to all construction personnel. Ensure workers are aware of potential hazards and understand safety protocols.
- **Personal Protective Equipment:** the contractor shall provide and mandate the use of appropriate PPE, including helmets, gloves, safety boots, and high-visibility vests.
- **Worksite Signage and Barriers: the contractor should c**learly mark hazardous zones with proper signage and barriers. Engineering controls should be put in place to prevent unauthorized access to construction and excavated trench areas.
- **Excavation and Trench Safety:** Implement proper shoring, shielding, or sloping for excavations and trenches. Regularly inspect trench integrity and monitor soil stability.

- **Material Handling and Storage:** Properly store materials to prevent tripping hazards and exposure to chemicals., Train workers in safe lifting techniques to avoid strains and injuries.
- **Emergency Response Preparedness:** Establish clear emergency response procedures and communication channels. Equip the site with first aid kits, emergency contact information, and medical personnel.
- **Safe site Operation**: Ensure all construction equipment is properly maintained and inspected. Regularly assess the condition of tools and machinery for safe operation.
- **Health Monitoring**: Conduct regular health check-ups for workers exposed to dust, noise, or hazardous materials. Provide access to medical care and facilities for immediate treatment of injuries. Regularly conduct intoxication test for the alcoholic and drug addict workers on site.
- **Regular Site Inspections:** Conduct frequent site inspections to identify and address potential hazards, promote a culture of proactive reporting and rectification of safety concerns.
- **Community Awareness:** Inform local residents about ongoing construction activities and potential hazards. Address community concerns and establish open lines of communication

7.3.8. Solid Waste Generation

The proposed project activities will generate large amounts of waste, including debris, packaging materials, and hazardous substances. Improper disposal of construction waste can lead to pollution of land, water, and air, further exacerbating environmental degradation.

Mitigation Measures

- The contractor in conjunction with the proponent will develop a comprehensive waste management plan that outlines strategies for minimizing, segregating, collecting, transporting, and disposing of solid waste generated during construction. The plan shall be communicated to all project stakeholders and strictly enforced throughout the construction phase.
- The contractor to prioritize waste reduction by adopting practices such as minimizing packaging, reusing materials where possible, and avoiding over-ordering of construction supplies.
- The contractor shall Implement a system for segregating waste at the source to separate recyclable materials from non-recyclable waste.
- The contractor to ensure that non-recyclable waste is disposed of properly and in compliance with EMCA (Waste Regulations). A licensed waste management companies to transport and dispose of waste at authorized disposal sites shall be sub contracted
- Provision of designated areas on-site for the temporary storage of waste materials. These areas shall be properly fenced, covered, and secured to prevent littering, scavenging, or unauthorized dumping.

- The proponent shall Implement regular monitoring and inspection procedures to assess waste management practices and identify areas for improvement.

7.3.9. Disturbance of Underground and road utilities

Construction crews often need to excavate trenches for laying water pipes, which can disturb the surface of roads and pavements. Chuka, like many urban areas, has a complex network of underground and road utilities including: storm water drains, sewer lines and communication cables. Construction activities may inadvertently disturb these utilities, leading to service interruptions, leaks, or even accidents if not properly managed.

Mitigation Measures

1. Prior to excavation a thorough utility location surveys should be conducted to accurately map the location of underground utilities.
2. Implement safe excavation practices, such as hand digging or hydro excavation, in areas where underground utilities are present. This reduces the risk of accidental damage to utility lines and minimizes disruptions to utility services.
3. Coordinate closely with utility providers and local authorities including road authorities to obtain accurate information about the location of underground utilities and coordinate construction activities to avoid conflicts.
4. Implement restoration of the damaged utilities in the process of excavation within the specified time of addressing the grievance as per the GRM.

7.3.10. Displacement of Livelihoods

The proposed LMC Project shall utilize a huge junk of roads reserve in Chuka however in some instances it will pass through private lands which h may require the relocation of some livelihoods within the wayleave. This can disrupt social networks, cultural ties, and livelihoods, leading to social unrest and psychological stress among affected individuals. In order to mitigate the impact, the proponent has rolled out a Resettlement Action Plan for the proposed project in response to provide a compensation plan for the livelihoods.

7.3.11. Conflicts brought by compensation

Disputes may arise over compensation for land acquisition, loss of livelihoods, or damages caused by construction activities. The PAPs may feel that they are not adequately compensated for the impacts of the project, leading to grievances and protests.
Mitigation Measures:

- Ensure that compensation packages are fair, transparent, and based on principles of equity and justice.
- Provide livelihood restoration support to affected communities, including assistance with finding alternative sources of income or employment opportunities.

- Establish grievance mechanisms to address complaints and grievances related to compensation, allowing affected individuals to seek recourse through formal channels.

7.3.12. Disruption of Businesses

The last-mile connectivity of the water project activities, will include but not limited to excavation, trenching, and installation of water supply lines, will disrupt regular business operations within the urban areas and shops, Road closures, traffic diversions, and noise pollution can impact accessibility to commercial establishments, leading to decreased foot traffic and sales.

Accidental damage to infrastructure, such as underground utilities or adjacent properties, during the installation can disrupt services and operations for nearby enterprises. Repairing damaged infrastructure may require additional time and resources, causing further inconvenience to businesses.

Mitigation measures to minimize the disturbance to enterprises during last-mile water supply connectivity projects shall include:

- The proponent to maintain regular communication with affected businesses to provide updates on construction schedules, anticipated disruptions, and mitigation measures. Coordinate construction activities to minimize impact on business operations.
- The contractor and the proponent to seek alternative access routes or pedestrian pathways to businesses affected by road closures or construction activities. The contractor to provide clear signage and directions to ensure customers can easily navigate to their intended destinations.
- The contractor to schedule construction activities during off-peak hours or non-business hours whenever possible to minimize disruption to enterprises. Limit noisy or disruptive activities during times when businesses are most active.
- The proponent to offer financial assistance or compensation to businesses experiencing significant revenue loss or damages due to construction-related disruptions.

7.3.13. Increased insecurity and Crime

The influx of unfamiliar individuals into the area seeking jobs within the project, the presence of valuable construction materials and equipment, and the disruption of normal security measures could trigger criminal activities including theft and robbery within the project area.

Mitigation Measures

1. The contractor should employ trained security personnel to patrol the construction site and monitor access points 24/7. Security guards should be equipped with communication devices and trained to respond effectively to security incidents.

2. Erect secure perimeter fencing around the construction site and implement access control measures such as gates, barriers, and checkpoints to regulate entry and exit. Only authorized personnel should be allowed access to the site.
3. Ensure adequate lighting around the construction site, especially during nighttime hours, to deter criminal activity and improve visibility for security personnel. Motion-activated lights can be particularly effective in detecting unauthorized intrusions.
4. The proponent and the contractor to foster positive relationships with the local community by engaging in regular communication and outreach efforts. Encourage community members to report suspicious activity to security personnel or local authorities.
5. The contractor should securely store valuable construction materials, equipment, and tools when not in use to prevent theft and vandalism.
6. The proponent in conjunction with the contractor should collaborate with local law enforcement agencies to address security concerns and coordinate responses to security incidents.

7.3.14. Gender-Based Violence and Sexual Harassment

This impact is associated with the failure of the Contractor to adhere to gender inclusivity requirements during the Project Construction Phase, leading to gender-based violence and sexual harassment. This occurs when workers are not hired inclusively and when gender policy and the 2/3 gender rule are not followed.

Mitigation Measures:

- Implement a clear human resources policy against sexual harassment in alignment with national law.
- Integrate provisions related to sexual harassment into the employee Code of Conduct (COC).
- Appoint human resources personnel responsible for managing reports of sexual harassment according to policy.
- Ensure that the Contractor's employees, sub-contractors, sub-consultants, and relevant personnel sign and adhere to a Code of Conduct containing provisions for protection against sexual exploitation and abuse.
- Implement provisions that prevent gender-based violence at the community level, including effective community engagement and consultation, especially involving women and girls.
- Review project components known to heighten GBV risk at the community level, such as compensation Projects and employment opportunities for women.

7.3.15. Child Labour during Construction

This impact highlights the possibility of child labour during construction, which is against the AfDB Operational Safeguards, Kenyan labour laws and has negative long-term effects on the economy and children's education.

Mitigation Measures:

- Enforce age verification procedures during worker hiring, including ID card checks and face-to-face ID verifications.

7.3.16. Sexual Exploitation and Abuse (SEA)

This impact involves sexual exploitation and abuse by Project staff against communities and is a risk throughout all project stages. Mitigation is achieved through management and coordination efforts, involving integrating SEA into various aspects of the project.

Mitigation Measures:

- Develop and execute a SEA action plan with an Accountability and Response Framework, in line with international guidelines.
- Prevention of SEA: Incorporate SEA prevention measures into Codes of Conduct and maintain ongoing staff sensitization.
- Response to SEA: establish procedures for survivor-centred referral and assistance, staff reporting mechanisms, and case oversight, investigation, and disciplinary processes.
- Engage the community with confidential complaints mechanisms and PSEA awareness-raising, using community-based IEC materials and outreach.
- Management and Coordination: Integrate SEA considerations into job descriptions, employment contracts, and performance appraisals; establish policies related to SEA and whistle blower protection; provide training for project management; manage a coordination mechanism for case oversight, investigations, and disciplinary actions; designate trained PSEA focal points and community liaison officers.

7.4. Expected Positive Environmental and Social Impacts During the Operation Phase

- **Improved Access to Clean Water**: the proposed Last-mile connectivity will ensure that even the most remote households and communities have access to clean and safe water for drinking, cooking, and hygiene purposes. This will help to reduce waterborne diseases and improves overall public health.
- **Enhanced Livelihoods**: With reliable access to clean water, residents will engage in income-generating activities such as small-scale agriculture and small-scale businesses more effectively. This will contribute to poverty reduction and economic development in the area.
- **Increased Productivity**: Having water readily available at the household level saves time and effort, particularly for women and children who are often responsible for fetching water. This allows them to allocate more time to education, employment, and other productive activities.
- **Social Equity and Inclusion**: Last-mile connectivity will ensure that marginalized communities, including those in the rural areas or informal settlements are not left

behind in accessing essential services. This promotes social equity and inclusion within the community.

- **Resilience to Climate Change**: Having a reliable piped water supply system increases within Chuka resilience to climate change-related challenges such as erratic rainfall patterns. Communities are better equipped to withstand water scarcity and adapt to changing environmental conditions.
- **Public Safety and Hygiene**: Access to clean water will facilitate proper sanitation and hygiene practices, reducing the spread of waterborne diseases and improving overall public health outcomes. This contributes to a safer and healthier living environment for residents.
- **Community Development**: Access to piped water will spur community development initiatives, such as the establishment of community gardens, schools, and healthcare facilities, further enhancing the overall quality of life in the area.

7.5. Expected Negative Environmental and Social Impacts During the Operation Phase

7.5.1. Reduced surface-water flows

The proposed last mile connectivity aims at enhancing increasing access to clean water within Chuka. The water tapped in to the system will be redirected from the normal river channel, causing alterations in the natural movement of water within the river system due to increased consumers downstream. This redirection may involve intercepting surface water flow that would typically discharge into the surface-water body or accelerating the movement of water from the surface-water body into an underlying aquifer. In both scenarios, the overall outcome is a decrease in flow to surface water, although the full impact may manifest gradually over several years.

To address these potential effects and ensure the sustainability of the water systems, the following mitigation measures shall be implemented:

- Catchment Zone Management: Implementation a comprehensive plan for managing and conserving the catchment zones within Mt Kenya. This can be achieved through strategic tree planting and vegetation management, which helps enhance water retention, reduce soil erosion, and maintain a healthy water balance.
- Hydrological Monitoring: Establish a robust system for regular monitoring of the spring, intermittent streams and surrounding hydrological conditions. This involves tracking changes in water levels, flow patterns, and aquifer recharge rates to assess the effectiveness of the undertaking
- Adaptive Management: Develop an adaptive management plan that allows for flexible adjustments based on monitoring results. This approach enables timely responses to changing conditions and ensures that corrective actions can be taken as needed.
- Community Engagement: Involve local communities in the management and monitoring efforts. Raise awareness about the importance of sustainable water use

and involve community members in the protection and conservation of the water resources.

- Restoration and Rehabilitation: If any adverse effects on water flow are observed, implement restoration and rehabilitation measures promptly. This could involve adjusting the design of the intake or undertaking additional activities to enhance water flow.

7.5.2. Occupational Health and Safety Hazards

During the operation phase, repair and maintenance activities if nor well handled can cause occupational hazards to workers.

Mitigation Measures

- **Document and communicate the safe operating procedures to the workers**: this will involve creating detailed written instructions and guidelines that outline the specific steps, precautions, and best practices to be followed when carrying out a particular task or operation.
- **Safety Training of workers:** Provide comprehensive safety training to workers on a regular basis. Ensure workers are aware of potential hazards and understand safety protocols.
- **Personal Protective Equipment:** NIWASCO to provide and enforce the use of appropriate PPE, including helmets, gloves, safety boots, and high-visibility vests.

7.5.3. Water Discharges during flushing/cleaning of pipes to remove sediments

The discharge of flushed water, which may be high in suspended solids, residual chlorine, and other contaminants that can harm surface waterbodies. The major environmental aspect of water pipe flushing is the discharge of flushed water, which may be high in suspended solids, residual chlorine, and other contaminants that can harm surface waterbodies.

Mitigation Measures

- Identify environmental issues that need mitigation during operation of the Project component.
- Develop management plans and procedures needed to address the environmental concerns
- Monitor and evaluate the performance against set targets
- Set a budget for environmental management and restorations
- Schedule for revising and updating the ESMMP
- Initiate sensitization programmes on best practices on solid waste management right from the source, sorting, transportation and disposal
- Conducting an initial audit in the first year of operation of the projects and subsequent annual audits of the operational activities.

7.5.4. Gender-Based Violence (GBV) at the Community Level

This impact pertains to potential gender-based violence faced by women and girls due to the project. It encompasses situations where the equal sharing of funds between husbands and wives triggers intimate partner violence (IPV) due to inadequate sensitization and safety measures. It also includes risks of GBV tied to income from water service revenue not adequately involving men in community consultations.

Mitigation Measures:

- Develop and execute provisions to prevent GBV at the community level resulting from the project.
- Engage and consult consistently with the community, especially women and girls, to curb GBV risks.
- Assess and adjust project components that heighten GBV risk, such as compensation and employment Projects for women.
- Establish a specific plan to sensitize the community on gender-equitable approaches to compensation and employment.
- Establish clear referral mechanisms for reporting GBV cases linked to project implementation.

7.5.5. Vandalism

The intentional and malicious acts aimed at damaging, destroying, or tampering with components of the water supply system can end up leading to water losses. This can have significant repercussions, including service disruptions, environmental contamination, public health risks, accidents and financial losses. Some of the mitigation measures include:

- Foster positive relationships with the community through education, outreach, and collaboration to promote a sense of ownership and responsibility of water supply infrastructure.
- Implement surveillance cameras, lighting, fencing, and security patrols to deter vandals and enhance the security of critical facilities.
- Raise awareness about the impacts of vandalism on public health, the environment, and community well-being, and encourage reporting of suspicious activities to authorities.
- Enforce strict penalties and legal consequences for acts of vandalism, including fines, restitution, and criminal prosecution, to deter future offenses and hold perpetrators accountable

7.6. Impacts During Decommissioning Phase

7.6.1. Water scarcity

The decommissioning of this Project would result in Chuka becoming a water-scarce area, posing a significant threat to the livelihoods and sanitation of its inhabitants. The residents will be forced to consume untreated water leading to water borne diseases

- **Alternative Water Source Development:** Identify and develop alternative water sources in close proximity to Chuka to ensure a continuous and reliable water supply for the community.
- **Community Awareness and Education:** Raise awareness among the community about the upcoming decommissioning exercise
- **Drought Resilience Measures:** Implement measures to enhance the community's resilience to drought, such as establishing community water storage facilities, emergency water distribution plans, and drought-tolerant crop cultivation.
- **Integrated Water Resource Management:** Collaborate with relevant stakeholders, including government agencies, NGOs, and local communities, to develop and implement a comprehensive water resource management plan for the region.
- **Rainwater Harvesting Systems:** Promote the installation of rainwater harvesting systems in households and public facilities to supplement water supply during dry periods.

7.6.2. Air Pollution

During the decommissioning phase, the operation of vehicles and machinery can result in air pollution due to emissions. Dust generated from activities such as accessing the project site and piling materials may contribute to local air quality degradation. The following mitigation measures for air pollution should be implemented by the contractors.

- Provide appropriate Personal Protective Equipment (PPE) for decommissioning workers.
- Apply water on uneven or bare areas at the project site and nearby access roads to suppress dust.

7.6.3. Solid Waste Generation

Decommissioning activities will produce various forms of solid waste, including debris, wrappings, concrete, human waste, and food waste. Improper handling and disposal of these wastes can lead to environmental pollution. While demolition waste is generally considered less harmful due to its inert composition, large quantities might release hazardous chemicals into the environment. Even typically non-toxic substances like chloride, sodium, sulphate, and ammonia, if released from leaching demolition waste, can impact water quality. To mitigate this:

- Implement careful demolition practices to maximize material reusability.
- Sell or donate reusable/recyclable materials to minimize waste.
- Follow an approved Decommissioning plan by NEMA for proper site rehabilitation and waste management.

7.6.4. Water Pollution

The decommissioning process poses a risk of contaminating nearby water bodies or groundwater sources due to dismantling, removing, the intake infrastructure. To address this concern:

- Develop and implement a comprehensive waste management plan for proper handling and disposal of materials and waste generated during decommissioning.
- Minimize the use of harmful chemicals and substances during the process, and properly manage potential contaminants.
- Establish spill prevention and response protocols, and have spill kits and containment measures on hand.
- After decommissioning, undertake site revegetation and restoration to stabilize soil, reduce erosion, and prevent runoff of pollutants into water bodies.

7.6.5. Noise and Vibration

Demolition works during decommissioning can result in significant noise and vibration impacts on the project site and surrounding areas. To mitigate these impacts:

- Scheduling: Conduct noisy activities during daytime hours to minimize disruption to nearby residents.
- Equipment Selection: Use noise-reducing equipment and machinery to lower noise emissions.
- Equipment Maintenance: Regularly maintain and inspect equipment to prevent excessive noise due to mechanical issues.
- Idle Time Management: Limit idling time for small equipment and encourage workers to turn off vehicle engines when not in use.
- Acoustic Enclosures: Enclose noisy machinery in soundproof enclosures to contain noise emissions.
- Personal Protective Equipment: Provide workers with earmuffs and other protective gear for noise reduction.
- Communication and Education: Inform nearby residents and workers about construction activities and noise levels to manage expectations and reduce disruptions.
- Adherence to Regulations: Comply with local noise regulations and guidelines to ensure noise levels remain within acceptable limits.

7.6.6. Occupational Health and Safety Concerns

Safety risks arise during the decommissioning phase due to material movement, uncovered holes, and structures. To address these concerns:

- Supply appropriate Personal Protective Equipment (PPE) for workers.
- Provide training in general safety, first aid, and fire procedures.
- Establish designated pathways for machinery and personnel movement.

- Implement mechanisms for reporting incidents, accidents, and dangerous occurrences.

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

8.1. Introduction

After a thorough evaluation of the impacts of the LMC for Chuka Water Supply project, an Environmental and Social Management and Monitoring Plan (ESMMP) has been developed to serves as a crucial tool for addressing the identified environmental and social impacts in a systematic and effective manner. The ESMMP provides a logical framework for mitigating negative impacts and enhancing positive ones by outlining specific measures and actions to be taken throughout the project lifecycle.

In cognisance of the dynamic nature of project conditions, the ESMMP has been developed with adaptability and flexibility as core principles. Regular reviews of the plan will be systematically conducted to ensure ongoing refinements. During the construction phase, the contractor, in collaboration with TWWDA, bears primary responsibility for adhering to the ESMP. As the project transitions to the operational stage, the responsibility shifts to the ESMMP implementation team at NIWASCO, the Water Service Provider. Regular monitoring and evaluation processes should be carried out to identify any instances of non-compliance by the contractor. Additionally, adequate resources must be allocated for the operational phase.

8.2. Environmental and Social Management Plan

Table 8.1: Project Environmental and Social Management and Monitoring Plan (ESMMP) for Chuka Water LMC Project

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
PRE-CONSTRUCTION PHASE					
Conflicts from local communities and contractors' workers	▪ 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 when engaging workers ▪ Create awareness to workers and local communities on the project Grievance Redress Mechanism (GRM)	TWWDA Contractor Resident Engineer	Staff records Records of grievances and complaints	Regularly	200,000
Delays in project implementation	▪ Liaison with various road agencies (KENHA, KURA, KERRA) and settlement of necessary fees for road permits to be issues in time to avoid project delays ▪ Liaison with NEMA for project licensing on time	TWWDA	Copies Permits Copy of NEMA license	Regularly	Operational costs
CONSTRUCTION PHASE					
Disturbance of water Supply in the locality	▪ Divide the construction process into phases to minimize the area of disturbance at any given time. ▪ Repair of leaks and instances of bursts caused by construction activities ▪ Implement controlled excavation techniques to minimize the disturbance to the surrounding sand ▪ Plan construction activities to occur during wet seasons when water is sufficient within homesteads.	TWWDA Contractor	Leaks and incidences of bursts caused by construction activities	Continuous	500,000

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
	▪ Community Engagement in the planning and execution of construction activities.				
Traffic Congestion	▪ Minimize disruption during peak travel times or major events can help reduce traffic congestion. ▪ Employ temporary traffic control measures including signage, and flagging operations to maintain traffic flow and minimize delays. ▪ Providing prior information to motorists about expected works and alternative routes. ▪ Engaging with the community and stakeholders through public outreach and communication campaigns can raise awareness about construction-related traffic impacts and encourage cooperation and understanding during the project. ▪ The contractor should collaborate with local transportation agencies and authorities to coordinate construction schedules, traffic management strategies.	Contractor	Traffic jams	Continuous	N/A
Loss of Biodiversity	▪ Transportation of materials and wastes to be done through the existing local roads. ▪ Sensitization of the work-force on environmental conservation and ecological protection. ▪ Re-vegetation of cleared areas with indigenous vegetation species ▪ Selective removal of trees within the construction area, ▪ Minimizing land clearing and disturbance of habitats, where possible the contractor to exercise selective removal of mature, indigenous trees and vegetation.	TWWDA Contractor	Trees count and vegetation cleared	Continuous	N/A

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
Noise Pollution	▪ Co-ordinate with relevant agencies regarding all substantial construction activities in the residential areas. ▪ Continuous monitoring of noise levels ▪ Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use, and encourage workers to switch off vehicle engines whenever possible. ▪ Provision of Personal Protective Equipment and clothing (PPE/C) including earmuffs for ear protection to the workers on site ▪ Restrict activities that create noise to daytime only. ▪ Proper maintenance of machinery to avoid unnecessary noise caused by worn out parts.	Contractor /Proponent	Noise levels	Continuous	10,000
Solid waste Generation	▪ Implement the project waste management plan ▪ Prioritization of waste reduction by adopting practices. ▪ Implementation of a system for segregating waste at the source to separate recyclable materials from non-recyclable waste. ▪ Non-recyclable waste to be disposed of properly and in compliance with EMCA (Waste Regulations). A licensed waste management company to transport and dispose of waste at authorized disposal sites shall be sub contracted ▪ Provision of designated areas on-site for the temporary storage of waste materials. ▪ Regular monitoring and inspection procedures to assess waste management practices and identify areas for improvement.	Contractor	Litter on site	Continuous	50,000
Disturbance of Road and	▪ Prior to excavation a thorough utility location surveys should be conducted to accurately map the location of underground utilities.	Contractor	Reported cases of	Continuous	1,000,000

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
Underground Utilities	▪ Implement safe excavation practices, such as hand digging or hydro excavation, in areas where underground utilities are present. ▪ Coordinate closely with utility providers and local authorities including road authorities to obtain accurate information about the location of underground utilities and coordinate construction activities to avoid conflicts. ▪ Implement restoration of the damaged utilities in the process of excavation within the specified time of addressing the grievance as per the GRM		breakage of utilities		
Air Pollution	▪ Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard. ▪ Project to be undertaken in phases to cushion the cumulative effects of dust, which would be great in case the project is done at once. ▪ Carry out suitable maintenance on all machinery to be used to avoid the emission of noxious gases. ▪ Drivers and machine operator to avoid unnecessary running of motor vehicle engines and machinery when not in use. ▪ Use of wet methods through water sprays and mists as dust suppression measures ▪ Provision of suitable PPE/C such as nose masks to the workers and staff on site.	Contractor	Air Quality	Continuous	N/A
Increased Water Demand	▪ Efficient water uses on site ▪ Practice water reuse ▪ Prompt repair of leaking water pipes	Contractor	Water usage	Continuous	N/A

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
Public Health and Safety	▪ The contractor labels and warn the public on the danger of construction activities ▪ The contractor to provide all workers with full protective gear ▪ The contractor to train and provide of First-aid Kit to the workers ▪ Provision of a general register on site for recording of injuries or any OHS incidence ▪ Putting up signages to caution possible hazards ▪ Preparation of a contingency plan for accident response ▪ Ensure the availability of Emergency contacts for police, ambulance, etc. ▪ Emergency plans should be communicated and well understood	TWWDA Contractor	Injuries/Fatalities/Near misses record	Continuous	20,000
Disruption of Businesses	▪ Maintain regular communication with affected businesses to provide updates on construction schedules, anticipated disruptions, and mitigation measures. ▪ Seek alternative access routes or pedestrian pathways to businesses affected by road closures or construction activities. ▪ The contractor to schedule construction activities during off-peak hours or non-business hours whenever possible.	TWWDA Contractor	Number of reported cases	Continuous	50,000
Insecurity and Crime	▪ Employ trained security personnel to patrol the construction site and monitor access points 24/7. ▪ Security guards should be equipped with communication devices and trained to respond effectively to security incidents. ▪ Erect secure perimeter fencing around the construction site and implement access control measures such as gates, barriers, and checkpoints to regulate entry and exit. ▪ Only authorized personnel should be allowed access to the site.	Contractor	Crime cases related to the project	Continuous	250,000

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
	▪ Ensure adequate lighting around the construction site, especially during night-time hours. ▪ Foster positive relationships with the local community to encourage community members to report suspicious activity to security personnel or local authorities. ▪ Should securely store valuable construction materials, equipment, and tools when not in use to prevent theft and vandalism. ▪ Collaborate with local law enforcement agencies to address security concerns and coordinate responses to security incidents.				
Gender Based Violence	▪ Implement a clear human resources policy against sexual harassment in alignment with national law. ▪ Integrate provisions related to sexual harassment into the employee Code of Conduct (COC). ▪ Appoint human resources personnel responsible for managing reports of sexual harassment according to policy. ▪ Ensure that the Contractor's employees, sub-contractors, sub-consultants, and relevant personnel sign and adhere to a Code of Conduct containing provisions for protection against sexual exploitation and abuse. ▪ Implement provisions that prevent gender-based violence at the community level, including effective community engagement and consultation, especially involving women and girls. ▪ Review project components known to heighten GBV risk at the community level, such as compensation Projects and employment opportunities for women.	Contractor/ Proponent	Reported Cases	Continuous	70,000

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
Child Labour	▪ Enforce age verification procedures during worker hiring, including ID card checks and face-to-face ID verifications.	Contractor/ Proponent	Reported Cases	Continuous	N/A
Sexual Exploitation and Abuse	▪ Develop and execute a SEA action plan with an Accountability and Response Framework, ▪ Incorporate SEA prevention measures into Codes of Conduct and maintain ongoing staff sensitization. ▪ Establish procedures for survivor-centred referral and assistance, staff reporting mechanisms, and case oversight, investigation, and disciplinary processes. ▪ Engage the community with confidential complaints mechanisms and PSEA awareness-raising, using community-based IEC materials and outreach. ▪ Integrate SEA considerations into job descriptions, employment contracts, and performance appraisals	Contractor / Proponent	Reported Cases	Continuous	120,000
TOTALS COST FOR CONSTRUCTION PHASE					**2,070,000**
OPERATION PHASE					
Reduced Water flows Downstream	▪ Implementation a comprehensive plan for managing and conserving the catchment zones within Chuka and Mt Kenya areas ▪ Establish a robust system for regular monitoring of the spring and surrounding hydrological conditions. ▪ Develop an adaptive management plan that allows for flexible adjustments based on monitoring results. ▪ Involve local communities in the management and monitoring efforts	NIWASCO TWWDA NEMA WRA	Water flow	Quarterly	Operational Costs

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
	▪ Implement restoration and rehabilitation measures promptly to enhance water flow.				
Gender Based Violence	▪ Develop and execute provisions to prevent GBV at the community level resulting from the project. ▪ Engage and consult consistently with the community, especially women and girls, to curb GBV risks. ▪ Assess and adjust project components that heighten GBV risk, such as compensation and employment Projects for women. ▪ Establish a specific plan to sensitize the community on gender-equitable approaches to compensation and employment. ▪ Establish clear referral mechanisms for reporting GBV cases linked to project implementation.	Kenya Police Service NIWASCO	Number of reported cases	Continuous	Operational Costs
Vandalism	▪ Foster positive relationships with the community through education, outreach, and collaboration to promote a sense of ownership and responsibility of water supply infrastructure. ▪ Raise awareness about the impacts of vandalism ▪ Enforce strict penalties and legal consequences for acts of vandalism, including fines, restitution, and criminal prosecution, to deter future offenses and hold perpetrators accountable	NIWASCO	Number of vandalism cases reported	Regularly	Operational costs
Occupational Health and Safety Hazards	▪ Document and communicate the safe operating procedures to the workers: this will involve creating detailed written instructions and guidelines that outline the specific steps, precautions, and best practices to be followed when carrying out a particular task or operation. ▪ Safety Training of workers: Provide comprehensive safety training to workers on a regular basis. Ensure workers are aware of potential hazards and understand safety protocols.	NIWASCO	Number of OHS hazards reported	Regularly	Operational costs

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
	▪ Provision and enforcement of use of appropriate Personal Protective Equipment including helmets, gloves, safety boots, and high-visibility vests.				
Water discharges during flushing/ cleaning of pipes to remove sediments	▪ Identify environmental issues that need mitigation during operation of the Project component. ▪ Develop management plans and procedures needed to address the environmental concerns ▪ Monitor and evaluate the performance against set targets ▪ Set a budget for environmental management and restorations ▪ Schedule for revising and updating the ESMMP ▪ Initiate sensitization programmes on best practices on solid waste management right from the source, sorting, transportation and disposal ▪ Conducting an initial audit in the first year of operation of the projects and subsequent annual audits of the operational activities.	NIWASCO	Soil and water quality test results Environmental Audit results	Regularly	Operational costs
DECOMMISSIONING PHASE					

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
Water Scarcity	▪ Identify and develop alternative water sources in close proximity to Chuka to ensure a continuous and reliable water supply for the community ▪ Raise awareness among the community about the upcoming decommissioning exercise ▪ Implement measures to enhance the community's resilience to drought, such as establishing community water storage facilities, emergency water distribution plans, and drought-tolerant crop cultivation. ▪ Collaborate with relevant stakeholders, including government agencies, NGOs, and local communities, to develop and implement a comprehensive water resource management plan for the region ▪ Promote the installation of rainwater harvesting systems in households and public facilities to supplement water supply during dry periods	TWWDA NIWASCO	Minutes of meeting with the local community Alternative projects in the area Water resource management plan	Continuous	To be determined
Air Pollution	▪ Provide appropriate Personal Protective Equipment (PPE) for decommissioning workers ▪ Apply water on uneven or bare areas at the project site and nearby access roads to suppress dust	TWWDA NIWASCO Contractor	Availability of PPEs	Continuous	To be determined
Solid Waste Generation	▪ Implement careful demolition practices to maximize material reusability ▪ Sell or donate reusable/recyclable materials to minimize waste ▪ Follow an approved Decommissioning plan by NEMA for proper site rehabilitation and waste management •	TWWDA NIWASCO Contractor	Decommissioning Plan Inventory of waste materials from	Continuous	To be determined

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
			decommissioning		
Water Pollution	▪ Develop and implement a comprehensive waste management plan for proper handling and disposal of materials and waste generated during decommissioning. ▪ Minimize the use of harmful chemicals and substances during the process, and properly manage potential contaminants. ▪ Establish spill prevention and response protocols, and have spill kits and containment measures on hand. ▪ After decommissioning, undertake site re-vegetation and restoration to stabilize soil, reduce erosion, and prevent runoff of pollutants into water bodies. •	TWWDA NIWASCO Contractor	Waste management plan Restored project sites Number of indigenous trees planted	Continuous	To be determined
Noise and Vibration	▪ Conduct noisy activities during daytime hours to minimize disruption to nearby residents. ▪ Use noise-reducing equipment and machinery to lower noise emissions. ▪ Regularly maintain and inspect equipment to prevent excessive noise due to mechanical issues. ▪ Limit idling time for small equipment and encourage workers to turn off vehicle engines when not in use. ▪ Enclose noisy machinery in soundproof enclosures to contain noise emissions. ▪ Provide workers with earmuffs and other protective gear for noise reduction. ▪ Inform nearby residents and workers about construction activities and noise levels to manage expectations and reduce disruptions	TWWDA NIWASCO Contractor	Number of complaints	Continuous	To be determined

Impact	Mitigation and Enhancement Measures	Responsibility	Indicator	Frequency	Annual Cost (KES)
	▪ Comply with local noise regulations and guidelines to ensure noise levels remain within acceptable limits				
Occupational Health and Safety Concerns	▪ Supply appropriate Personal Protective Equipment (PPE) for workers ▪ Provide training to workers on general safety and first aid ▪ Establish designated pathways for machinery and personnel movement. ▪ Implement mechanisms for reporting incidents, accidents, and dangerous occurrences	TWWDA NIWASCO Contractor	Records on accidents Training Reports	Continuous	To be determined
TOTAL ESMP Budget					**2,270,000**

8.2.1. Management Responsibility of the ESMMP

In order to ensure the sound development and effective implementation of the ESMMP, it will be necessary to identify and define the responsibilities and authority of the various persons and Organizations which will be involved in the project. Table 8.2 below presents the roles and responsibilities of various entities in ESMMP implementation.

Table 8.2: Roles and Responsibilities of various entities in ESMMP implementation

Entity	Roles and Responsibilities in ESMMP Implementation
Project Implementation Unit, Tana Water Works Development Agency (TWWDA)	• To ensure that all project operations are conducted in accordance with their internal environmental policies and in accordance with the ESMMP • Ensure that all authorizations/Approvals/Licenses required for project implementation are obtained; • Request the contractor operates on the basis of valid Authorizations/approvals/licenses for the activities to be implemented; • Ensure that the EMP is an integral part of the contract document with the Contractor and that the contractor will be responsible for its implementation; • Establish institutional linkages with relevant parties in the project implementation as needed, or designate a representative for that purpose; • Ensure that the various project activities comply with the mitigation measures proposed in the Environmental Management and Monitoring Program (ESMMP) • Make regular inspections to all the different activities with regard to social aspects, health, safety and environment and check for any non-conformity with the ESMMP attributable to the Contractor and identify the steps taken for its correction
National Environmental Management Authority (NEMA)	Regulatory function • Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plans, programmes and projects. • Identify projects and programmes or types of projects and programmes, plans and policies for which environmental audit or environmental monitoring must be conducted under this Act; • Monitor and assess activities, including activities being carried out by relevant lead agencies, in order to ensure that the environment is not degraded by such activities
Nithi Water and Sanitation Company (NIWASCO)	• Operate and maintain the water supply system in a manner that will reduce non-revenue water • Manage any sewer spills and clear and disinfect affected properties or environment

Entity	Roles and Responsibilities in ESMMP Implementation
	• Carry out effluent quality analysis in collaboration with other government lead agencies • Ensure treated wastewater and sludge for re-use/disposal meets accepted health standards • Conduct regular monitoring and inspection to ensure facilities are not interfered with • Ensure that effluent discharged from industries into the sewage system is treated and meets effluent discharge quality standards
Contractor	• Prepare own ESMP implementation plan as well as a health and safety plan within 30 days of signing of the contract. • Operate on the basis of valid Licenses/Approvals/Authorizations for the activities to be implemented; • Prevent or minimize the occurrence of accidents which might cause damage to the environment and be able to respond positively to an accident if it occurs; • Ensure compliance to working procedures and environmental requirements and health and safety established in the contract with the Proponent; • Minimize environmental damage, waste control, avoid pollution, prevent loss or damage on natural resources and minimize the effects on the users and occupants of surrounding lands and the public; • Provide Personal Protective Equipment (PPE) to workers which are appropriate to the tasks to be performed and ensure that it is used; • Manage the complaints process on the elements that fall within its jurisdiction, or refer complaints to the Proponent, so that they can receive treatment/appropriate response;
Supervising Consultant/ Resident Engineer	• To ensure that the ESMMP is upto-date and is being used by the contractor. • Conduct periodic audits of the ESMMP to ensure that its performance is as expected
County Government of Tharaka Nithi	• The relevant departmental officers in the above county government will be called upon where necessary during Project implementation to provide the necessary permits and advisory services to the project implementers
Directorate of Occupational Safety and Health Services (DOSHS)	• To register the project site as a work station and subsequent enforcement of relevant provisions in occupational safety and health in line with Occupational Safety and Health Act, 2007.
Water Resource Authority (WRA)	• Monitor and enforce conditions attached to water permits and water use; • Regulate and protect water resources quality from adverse impacts; • Regulate and protect water resources from adverse impacts; • Regulate water infrastructure, use and effluent discharge; • Work with the beneficiary communities to manage and protect water catchments; • Establish water resources monitoring networks

8.2.2. Monitoring and Auditing of ESMMP

Environmental monitoring and audits are essential in the project's life span as they are conducted to establish if project implementation has complied with set environmental management standards in accordance with applicable legislation and regulations. In this Project, Annual Environmental Audits will be conducted to check the status of compliance with the project ESMMP and its efficacy. Environmental concerns, that will be monitored and audited regularly during the project's construction and maintenance period include: water quality and resource use, soil erosion and occupational health and safety issues.

8.3. Monitoring of Occupational Health and Safety Issues

Project activities during the construction and operation phase involve a lot of risks and exposure to hazards. It is therefore important to regularly check and monitor the activities to find out the extent to which the impacts are mitigated and emerging problems are addressed. Table 8.4 presents a monitoring plan of the key issues key verifiable indicators which will be used to monitor the impacts are presented below.

Table 8.3: Monitoring of Occupational Health and Safety Issues

Monitoring Parameters	Responsibility	Monitoring Location(s)	Time/ Frequency	Indicators
Condition of machinery and equipment	Contractor NIWASCO	At work stations	Weekly	Service, maintenance, repair or replacement records of faulty machines
Accidents, incidents, injuries etc.	Contractor, NIWASCO	At work stations	Daily	Mitigation/prevention measures in place, PPEs, Records of incidents or accidents, medical records, Training, First Aid kits; Fire extinguishers
Dust and exhaust emission	Contractor, NIWASCO	At work stations	Daily	Health safety measures in place
Noise emissions	Contractor	At work stations	Daily	Noise monitoring records
Sanitation and welfare facilities	Contractor, NIWASCO	Workers camps, construction sites and site 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, NIWASCO	Workers camps,	Daily/weekly	Inspection and waste disposal records

Monitoring Parameters	Responsibility	Monitoring Location(s)	Time/ Frequency	Indicators
		construction sites Site offices		

8.4. Water Resources Monitoring

Table 8.4: Water Resources Monitoring

Monitoring Parameters	Responsibility	Monitoring Measures	Time/Frequency
Disturbance to river flow	NIWASCO, WRA	After construction, the river morphology and sediment transport will be monitored until the end of first complete wet season. Upstream and downstream water quality monitoring will be conducted periodically pre and post construction	Quarterly
Contamination of water resources by poor waste management	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	NIWASCO, WRA	Undertake water quality monitoring throughout the construction period and even after construction	Review of records

8.5. Soil Erosion Monitoring

Table 8.5 Soil Erosion Monitoring Parameters

Monitoring Parameters	Responsibility	Mitigation Measure	Monitoring Measures	Frequency of Monitoring
Soil Erosion	TWWDA Contractor	Natural re-vegetation following construction Reinstatement and re-contouring of soils Proper handling of soil to preserve different soil layers	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 re-vegetation	Daily Records
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	In case of contamination, a risk assessment will be done to ascertain the cause of contamination, treatment and disposal option.	Daily Site inspections and quarterly chemical analysis of soil and water

Monitoring Parameters	Responsibility	Mitigation Measure	Monitoring Measures	Frequency of Monitoring
		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	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	
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 and grease straps at refueling facilities, workshops and parking yards, fuel storage and containment areas in order to reduce potential contamination	Define the frequency and extent of soil sampling to be conducted at suitable depths to assess any possibility of contamination	Regularly

8.6. Decommissioning Plan

The Project has been designed to operate effectively for over 20years. Before commencement of decommissioning activities, the proponent shall develop a Decommissioning Plan. The plan will guide on the various activities which will include the following:

- Details of infrastructure, buildings and structures to be retained; alternative uses and further development proposals for retained infrastructure, and structures; infrastructure and structures to be dismantled, removed, sold for recycling and / or disposed-off.
- Environmental restoration plan. The dismantling of site facilities and transportation of material may expose the ground, leave open pits and disturb vegetation. Such sites can be restored by backfilling with soil and replanting of grass or trees on disturbed areas.
- Waste Management Plan – A formal site waste management plan should be developed to ensure that both solid and liquid waste is managed in accordance to the existing applicable laws on waste handling and disposal.
- Health & Safety plan that shall be implemented to safeguard the safety, health and welfare of workers and the public. Establish and operate an emergency evacuation procedure for casualties.

- Mechanisms for addressing project related social issues
- Take note of any existing regional and national development plans that may be of relevance to the area.

9. CONCLUSION AND RECOMMENDATIONS

The proposed last mile connectivity of the water supply infrastructure at Chuka presents a timely opportunity to positively transform the lives of the local community. The comprehensive assessment of the project concludes that its benefits far outweigh the potential biophysical and social environmental impacts. Importantly, the identified environmental impacts are minimal and have been addressed through well-designed mitigation measures, ensuring the integrity and sustainability of the project's environmental aspects.

The Environmental and Social Management Plans will play a crucial role in outlining a structured framework for addressing and mitigating these potential impacts. Additionally, the it provides cost estimates associated with implementing the identified mitigation measures, demonstrating a commitment to responsible environmental management. Adhering to the outlined mitigation strategies and ensuring effective implementation, positions the project to contribute positively to the community's well-being while upholding environmental integrity and sustainable development. It is recommended that the project should be licensed for implementation.

It is further recommended that:

- The contractor and the project proponent are strongly encouraged to initiate transparent and open dialogues with the local community to effectively preclude any potential water scarcity issues that might arise during the construction phase. It is of utmost importance to underscore that construction activities must not worsen the existing water shortage situation in the vicinity. Ensuring uninterrupted access to water for the community's needs throughout the construction period is paramount.
- The ESIA report should be shared with the chosen contractor for full implementation of the environmental and social management plan during the construction phase
- In line with community development, the chosen contractors should give priority to hiring local youth whenever employment opportunities emerge throughout the project's timeline. This approach fosters local engagement, skills development, and economic empowerment within the community.
- The water supply Project shall be subject to continuous monitoring of its functionality during operational phases in essentiality to ensure its in alignment with the latest advancements in water management and supply technologies. Annual environmental and due diligence audits should be carried out to verify the project's compliance with both national and international environmental laws and policies.
- NIWASCO in conjunction with the community is encouraged to actively participate in catchment protection and restoration activities aimed at enhancing water yield in the intake. This will contribute significantly to the sustainable management of water resources and the overall well-being of both the environment and its residents.

- Install warning/information signs (billboards) at the site, prominently displaying construction operating hours and estimated activity times. These signs should ensure visibility for the public, especially motorists.
- The proponent should consider erecting purpose-built water troughs designed exclusively for wildlife represents a proactive strategy to mitigate human-wildlife conflicts. These specialized water troughs shall offer a distinct water supply for wildlife, thereby diminishing their reliance on community water sources and reducing the likelihood of undesirable interactions between wildlife and humans.

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APPENDICES

1. Appendix 1: Community Engagement Minutes

II ndagani -chuka water LMC project Minutes 2.pdf

2. Appendix 2: Public Participation Attendance Lists

Chuka LMC Water Supply Project_Public Participation List.pdf

3. Appendix 3: Questionnaires

Questionnaires for Chuka Water Supply Project_LMC.pdf

4. Appendix 4: Grievance Redress Mechanism Tools

1. Grievance Register/ Acknowledgement Form, GRM/ 001

Date of receiving the grievance: …….
Grievance Number: …….
Project Name: ……...
Mode of Receipt (tick where applicable)

Writing	Verbal	Phone	Email

Details of the Grievance
Name: ……
Gender: …….
Contacts/ Email address: ……
Location of complainant:
Village/ location/ sublocation: ……. County: ……

Category of Complainant (tick appropriately)

i. Local Communities
ii. Regulatory bodies and Road agencies (tick where applicable)

NEMA	WRA	Road Agencies (specify)	KFS	KWS	Any other specify

iii. Contractors
iv. NGOs, CBOs
v. Funding institution/ AfDB
vi. Other interested party (specify)

Category of Grievance (tick appropriately)

i. Project implementation related
ii. Social
iii. Environment

Brief Description of the grievance
……
……
……
(attach letter or any document provided by the complainant)
Received/ prepared by:
Name: …….
Date: ……

Signature: ……

2. Grievance Resolution Form – GRM/ 002

Date of Meeting: …….
Complaint No: …….
Venue of Meeting: ……

List of Participants

Complainant side	Local Grievance Redress Committee Members present
1.	1.
2.	2.
3.	3.
4.	4.

Brief Description of the Grievance:
……
……
……

Key Discussions
1.
2.
3.

Recommendations made by the Local Grievance Redress Committee
1.
2.
3.

Status of Grievance (Tick appropriately)

Solved	*Unsolved*

Chairperson, Local Grievance Redress Committee
Name: ……
Signature: ……
Date: ……...

3. Grievance Disclosure Form – GRM/ 003

Complaint No: ……...
Name of Complainant: ……...
Date of Grievance Redress: ……
Brief Description of Grievance:
……
……
……

Summary of Resolution:
……
……
……
Name of complainant: ……
Signature of complainant (indicating acceptance of the solution or action taken for his grievance)
……
Name of the Grievance Handling Officer: ……...
Signature of the Grievance Handling Officer: ……
Date (dd/mm/yy): …….

4. Format of Quarterly Reports of all Grievances – GRM/ 004

1.0 General Information

Project Name: …….
Date: …….
County: …….
Period of Reporting (Quarter): ……...

2.0 Summary of Complaints Received

Sn.	Name and Address of Complainant	Location of Complaint	Date of receipt of the complaint	Complaint Number
1				
2				
3				

3.0 Summary of Grievance Redress Meetings Held

Complaint No.	Brief Description of Complaint	Date of Meeting	Name of Participants	Recommendations Issued	Date of issuance of grievance disclosure form

4.0 Key Challenges and Measures Taken

5.0 Appendices

- Grievance register
- Minutes of meetings held
- Attendance register (signed)

5. Appendix 5: Photo Gallery

	
Official from NIWASCO giving remarks at Ndagani	Ms Wairimu an Environment expert attending to issues raised by community members at Ndaagani
	
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 giving his contribution at a community consultation meeting at Ndagani

TANA WATER WORKS DEVELOPMENT AGENCY

THE PUBLIC PARTICIPATION MINUTES FOR LAST MILE CONNECTIVITY OF THE CHUKA WATER SUPPLY AND SEWERAGE PROJECTS 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
James Kabii	He enquired how the community members would get water connection?	After construction and successful commissioning of the water project, the TWWDA shall hand over the project to the area Water Service Provider; NIWASCO
Catherine Mutembei	Due to the loss of utility of the land through which the water pipeline line will pass, will the affected persons be compensated and when will the compensation process commence?	Compensation for all persons that will be directly affected by the projects shall be done diligently following the Resettlement Action plan that shall be formulated by the consultant.

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 WATER SUPPLY PROJECT

PUBLIC PARTICIPATION LIST

VENUE Water office Chuka **DATE** 15/02/24 **TIME** 9.00 AM

S/ No.	NAME	VILLAGE/INSTITUTION	ID No	CONTACTS	SIGN
1	Benson Ndeke	KIBUMBU	8857681	0727551277	Bndeke
2.	Japhet Murithi	Kibumbu	12731562	0728825579	Murithi
3.	Catherine Gatune	Kibumbu	12964182	0710609612	
4	Stella Kainda	Kibumbu	23767770	0716233057	Stella
5.	Hamson Mwithi	Kibumbu	11695604	0720536834	
6.	Ann Nduta	Kibumbu	26000918	0702937534	ANNE
7.	Johnson Mugambi	Kibumbu	24154506		mugambi
8	Eliphelet Mukuru	Kibumbu	1739516	0727989340	mukuru.
9.	Bridget Kagendo	Kibumbu	19964864	0723466734	BK
10.	~~OTTO~~ Timothy Muchangi	Kibumbu	30586110 ~~17282226~~	0104177789	TM Kaari
11	Charity Kaari	Kibumbu	17282226		Kaari

OFFICE OF THE ASSISTANT CHIEF
CHUKA TOWNSHIP
P. O. Box 80 - 60400, CHUKA
Date 15/02/2024

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 WATER SUPPLY PROJECT

PUBLIC PARTICIPATION LIST

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

S/ No.	NAME	VILLAGE/INSTITUTION	ID No	CONTACTS	SIGN
12	CECILIA KAGENDO	KIBUMBU	28240644	0713032114	Kag
13	DONARD NYAGA KAROMBO	KIBUMBU	4321870	0710805257	
14	PHILIS K NBOANI	KIBUMBU	4320395	0716130053	
15	GLADYS KAIGONGI	KIBUMBU	21853109	0724145	
16	Judy CIAMBAKA Njagi	KIBUMBU	44447797	0714801522	Judy
17	Peter Murithi	Kibumbu	13617808	0711564996	Murithi
18	Patrick Micheni	Kibumbu		0726393970	
19	Justin Kiruja Magori	Chuka Town	7209120	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 ..12:00 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 Mutagwo	Kishuswa	32884816	0799245174	
10	REV. ARMSTRONG N. NJERU	NDAGANI MKT & RUKINDU VILLAGE	50863443	0721 327807 0733 788448	
11	Catherine Muthembe	Gichucha	10795294	0726056300	

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 ..... Ndugani 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	0728479708	
13	MARY CIAMBAKIA	NDAGANI		0721828989	
14	NJAGI CHARLES	NGAO CHIEF	01261398	0724288012	
15	JANE MUHARI	NJAGANI	7029873	0721333973	

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

Proposed Last Mile Connectivity of Chuka Water Supply 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:

we will provide man power

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?

Damaging the existing line making us to use alot of money

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

We should be careful when trenching not to damage the existing water lines

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

They own the water so that it won't cause any distration

Name: Faith Micheni Date: 22/8/2024

Designation / Residence: KK village

Contact: 0723947082

Signature: Faith

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 Water Supply 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:

→ It will provide job opportunities to youth.

→ Enough water will improve good health.

CHIEF
KARINGANI LOCATION
DATE..2.3.[illegible]

→ Promote Climate Changes & planting of more trees.

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

Destruction of Trees, where sewerage will pass thro land etc
Causes soil erosion if not well
Maintain due to digging of soil.

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

(1) Do sensetization to the community
(2) measure the site where it will pass through to avoid destruction

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

- Encourage all members to be register to the project
- Encourage members to own the project

Name: Juster Muthoni Date: 22/3/24

Designation / Residence: Ndagani Sub-location

Contact: 0710787153

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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(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:

It will improve irrigation and good Sanitation in the Community

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 to consider employing residence from the area.

Name: WANGARE Date: 22/3/2024

Designation / Residence: KARINGANI

Contact: 0790955046

Signature: ~~Wato~~

CHIEF
KARINGANI LOCATION
DATE 22/3/2024

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:

The Project is suitable for
keeping environment clean as by
Adaptation of Mutual to the
community / Also Water

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?

Dust emission / cutting of trees and some gas fumes emissions

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

Repairing of broken pipes
Maintance of water
Repairing the effects and provid jobs to the locality of the area

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

providing job opportunity to the people around

Name: ..... Date: 22/03/2024

Designation / Residence: CHUKA

Contact: —

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 Water Supply 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:

...Health promotion and Job opportunities

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
- Promotion of job opportunity

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

- Promotion of job opportunities
- promote of Employment chance

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

- All youth in ward member of said proposed project

Name: NJAU CHARLES Date: 22/8/2024

Designation / Residence: Ndeiya

Contact: 0724284017

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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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:

PROVISION OF LABOUR
LOCAL COMMUNITY

CHIEF
KARINGANI LOCATION
DATE. 22/8/2023

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

INTERRUPTION OF EXISTING WATER LINES WITHIN THE VICINITY, A ROAD INFRASTURE AND SOIL EROSION

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

1. BE CAUTIOUS ABOUT CONSERVING EXISTING PIPES
2. NOT TO INTERUPT EXISTING ROAD NETWORK

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

TO OBSERVE ENVIROMENTAL POLLUTION

Name: Anderson Wukuru Date: 22/3/2024

Designation / Residence: Murugoni

Contact: 0724583878

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 Water Supply 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.

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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:

...Health...promotion...and...job...opportunities

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
- ~~promotion of job opportunity~~

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

- promotion of job opportunities
- promote of Environment clages

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

- All ~~was~~ people to be member of Said proposed projects

Name: NJAU CHARLES Date: 22/8/2024

Designation / Residence: Nakuru

Contact: 0724284017

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:

Provision of Job opportunity for the Youth

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?

Name: Lloyd Riungu Date: 22/03/24

Designation / Residence: ✓ Residence

Contact: lloyydr@gmail.com

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:

.....
.....Development of town.....
.....
.....
.....

CHIEF
KARINGANI LOCATION
DATE. 22/8/2022

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.

.....
.....Employment of locals.....
.....
.....
.....
.....
.....

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

.....
.....Good work.....
.....
.....
.....
.....
.....

Name: .....Japheth Mwanda.....Date: .....22/03/2024.....

Designation / Residence: .....

Contact.....

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:

This will simplify the cost of ~~laying~~ individual drainage.....

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

Destruction of crops and roads when it pass through.

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

1. Engravel the road after works
2. Put road signs.
3. Good co-operation

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

It is of importance to the community.

Name: Benson Ndeke Misheck Date: 15/02/2024.

Designation / Residence: Area Manager

Contact... 0727551277

Signature... BNdeke

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 to youth
/ 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
Destruction of Structures

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

Inform the members of public during the operation
Engagement of the residents

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

Nice project

Name: EDICK MWENDA Date: 15/01/2024

Designation / Residence: Ass. Chief

Contact 0726555615

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:

1. We Shall have a Modern System to dispose our waste (septic) which will be cheap and long lasting Solution
2. We fresh water that goes together with the sewer System with Ease to give Us Convenient Connection

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

I dont anticipate any because People are willing to give out Wayleave where the sewer line Passes

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

He should not ~~build~~ develop (build) any Structure ab the Wayleave trace

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

Some Plots are not Served by any Secondary and Primary line (Sewer) so we are hopeful to be considered

Name: Justin K. Mabuki Date: .....

Designation / Residence: Business Man | Proprietor of Several Plots in Chuka Town

Contact: 0722336883

Signature: .....

THANK YOU FOR YOUR RESPONSE

EIA 23062804

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/2186**

Application Reference No: **NEMA/EIA/VEIA/3528**

This is to certify that the Environmental Impact Assessment License No **NEMA/EIA/PSL/8725** issued on 12/9/2019

to **Tana Water Services Board.**

of

P.O.Box 1912- 10100, Nyeri.

regarding

Proposed Chuka Water Supply Infrastructure.

whose objective is

Construction of Chuka Water Supply Infrastructure.

located at

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/8725 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/8725

Application Reference No: NEMA/EIA/SR/1282

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 Water Supply Infrastructure.

whose objective is to carry on

Construction of Chuka water supply infrastructure.

located at

Tharaka Nithi County.

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

Issue Date : **09 December, 2019**

Signature

(Seal)

Director-General
The National Environment Management Authority.

P.T.O

ISO 9001 BUREAU VERITAS Certification UKAS

ISO 9001: 2008 Certified

1.0 General Conditions

1.1 This project is for the proposed Chuka Water Supply infrastructure in 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 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.

1.5 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 Coordination Act, Cap 387 and regulations therein.

1.6 This license shall not be taken as statutory defence against charges of environmental degradation or pollution in respect of any manner of degradation/pollution not specified herein.

1.7 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.

1.8 The proponent shall submit an Environmental Audit report in the first year of occupation/operations/commissioning to confirm the efficacy and adequacy of the Environmental Management Plan.

1.9 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.

1.10 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 The proponent shall put up a project signboard as per the Ministry of Transport and Infrastructure standards showing the NEMA EIA license number among other details.

2.3 The proponent shall seek authorization from the Water Resources Authority for the proposed in-water works and for water abstraction, prior to commencement of works.

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

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

2.6 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).

2.7 The proponent shall continually consult with the County Government of Tharaka Nithi to ensure that pertinent issues relating to equitable sharing of the abstracted water are resolved amicably to ensure project sustainability.

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

2.9 The proponent shall ensure strict adherence to the provisions of the National Construction Act of 2011.

2.10 The proponent shall ensure that no excavated debris or other forms of wastes are disposed off or deposited in the rivers.

2.11 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 and Coordination (Waste Management) Regulations of 2006.

2.12 The proponent shall ensure that activities are undertaken during the day between 0800hrs and 1800hrs and on Saturday between 0800hrs to 1300hrs. No work shall be undertaken on Sundays; and that transportation of construction material to and from site is undertaken during weekdays and Saturdays only during the hours specified herein.

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

2.14 The proponent shall ensure strict adherence to the Environmental Management Plan (EMP) developed throughout the project cycle.

3.0 Operational Conditions

3.1 The proponent shall adhere to the conditions issued by the Water Resource Authority for in-water works and water use permits.

3.2 The proponent shall ensure that sanitary facilities are constructed at suitable places so as to avoid contamination of water bodies and the subsequent water-borne diseases/vectors.

3.3 The proponent shall ensure that the chemicals used for water treatment (such as Alum) are appropriately handled and disposed off as provided for in their respective Material Safety Data Sheets.

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

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

3.6 The proponent shall ensure that appropriate and functional efficient air pollution control mechanisms are installed to control all air emissions.

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

3.8 The proponent shall ensure that rain water harvesting facilities are provided to supplement surface and ground water.

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

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

3.11 The proponent shall ensure that all workers are well protected and trained as per the Occupational Safety and Health Act (OSHA) of 2007.

3.12 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 County Government of Tharaka Nithi, Kenya Forest Service, Ministry of Health, Kenya Rural Roads Authority, Ministry of Land, Housing and Urban Development, Water Resources Authority, and other relevant Authorities.

3.13 The proponent shall ensure that environmental protection facilities or measures to prevent pollution and ecological deterioration such as soil erosion control, functional storm drainage, catchment protection, river pollution prevention, equitable water supply mechanisms are designed, constructed and employed simultaneously with the proposed project.

4.0 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.**0786101100** 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 in writing of its intent to decommission the facility **three (3) months** in advance.

5.0 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.