THE REPUBLIC OF KENYA

NORTHERN WATER WORKS DEVELOPMENT AGENCY

CONSULTANCY SERVICES FOR DETAILED DESIGN OF LOYAINGALANI TOWN WATER SUPPLY AND SANITATION PROJECT

ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT PROJECT REPORT

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ENVIRONMENT AND SOCIAL IMPACT PROJECT REPORT (ESIA)

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DOCUMENT TITLE: ENVIRONMENT AND SOCIAL IMPACT PROJECT REPORT (ESIA)

E. EXECUTIVE SUMMARY

E.1 PROJECT INFORMATION

Northern Water Works Development Agency (NWWDA) in collaboration with commissioned Tana Water Works Development Agency Kiri Consult Limited (hereafter referred to as Kiri or the Consultant) to undertake the "Detailed Design of Loiyangalani Town Water Supply and Sanitation Project" to improve water supply and sanitation services in Loiyangalani Town which is classified as arid and semi-arid area.

This report therefore presents findings of Resettlement Action Plan (RAP) prepared for Project Affected Persons (PAPs) in Loiyangalani Town who will be affected by the proposed Water and Sanitation Project. The report also provides applicable entitlements compensation and livelihood restoration measures to the Project Affected Persons (PAPs) identified as required by Kenya's laws and regulations. The assessment also made reference to the African Development Bank (AfDB) Operation Safeguard (OS 1) on Involuntary Resettlement Land Acquisition, Population Displacement, and Compensation.

E.2 SCOPE OF WORKS

The major components of the project are:

a) Water Component

Table E-1: Summary of analyzed water supply options

Water Component	Details
Abstraction and raw water transmission and pumping facilities	i. Seven (7) boreholes in the vicinity of the Ngobeleng Spring site ii. Solar pumps
Water treatment facilities consisting of:	Disinfection: of the water by dosing of calcium hypochlorite followed by adequate contact time to ensure that it is safe for consumption. Automatic Chlorine Dosers for accurate in-line injection of chlorine, installed directly on the raw water supply line with a hydraulic motor pump that will use the water flow as its energy source
Gravity Transmission Main Pipeline, Approx. 3km long:	Supply and installation of OD315 HDPE pipes, valves and fittings, including associated concrete and masonry works in pipeline supports, valve chambers, washout drains, etc.
Storage Tanks	i) One no. 500 m^3 ground water tank ii) Three 100m^3 elevated tank.
Pumping Station:	Supply and installation of pumping equipment and associated piping, valves, fittings including support and foundation concrete, mechanical and electrical works.
Distribution Network	Approximately 30 km total length of various diameter of HDPE and steel pipes, valves and fittings, including associated concrete and masonry works in pipeline supports, valve chambers, washout drains, etc. as shown in the bill of Quantities and drawings
Komote village reverse osmosis water treatment units	Two reverse Osmosis Units were considered to meet phase 1 demand with a capacity to treat 10m^3/day consisting of the following: • Pre-treatment sand and activated carbon

	• Ion Exchange Resin • Catridge Filter • Ultraviolet Disinfecting Unit

Approximate Project Cost is KES. 610,000,000.00

b) Sanitation Component

i. On-site sanitation facilities have been proposed for Loiyangalani Town, together with faecal sludge treatment plant, for phase 1 (2025-2035). The feasibility report provides the construction of 2no sludge drying beds each 1391m^2 in Loyaingalani town and a wetland (23.75m long by 12.5m wide as indicated below

B. Faecal Sludge Treatment Plant

- Sludge Drying Bed
- Vertical Flow Constructed Wetland
- Solid Waste Incinerator
- Operator Store
- Site and Auxiliary Works
- Guard House

C. Ablution blocks at specified locations

D. Lined pit latrines at the household level will be constructed by owners with subsidy of Kshs. 20, 000 per latrine by WSTF if approved by the WSTF

ii. It is proposed that for Phase 2 (2035 – 2045), a review be done on the population density and socio-economic characteristics in Loiyangalani town to establish if a centralized water-borne sewerage will be appropriate for the Town at that stage.

A summary of sanitation Scope of Works is presented in **Table E.3** Below

Table E-2: Summary of analyzed Sanitation Facilities Component

Intervention	**Scope**	**Estimated Budget**
Pit Latrine	1. Short term: 48 lined pit latrines potential owners receive Ksh. 20,000 per latrine **annually** 2. Medium term:41 lined pit latrines	8,900,000
	1. Medium term: 28 standard toilets potential owners receive Ksh. 40,000 per toilet+septic tank **annually** Ksh. 20,000 per toilet and Ksh. 20000 subsidy per septic tank 2. Long term: 25 toilets and septic tanks	15,600,000
	1. Short term: 48 lined pit latrines 2. Medium term:41 lined pit latrines	18,597,440
	1. Medium term: 28 standard toilets p septic tank 2. Long term: 25 toilets and septic tanks	40,509,300
Sub Total 1	**Pit Latrines**	**83,660,704**
Ablution blocks at open defecation hotspots commissioned and operational	Construct 3 Ablution blocks: 1. Near the current bus stage 2. In Kiwanja Ndege to prevent open defecation in the Oasis hosting Maji Moto Springs 3. One in Kula mawe to be used by the population around that area	2,310,000

	2 additional ablution blocks commisioned and operational in Town Centre	1,540,000
	5 Ablution blocks contracted to service providers and operational	770,000
Ablution blocks in Schools constructed, commissioned and operational	Construct Ablution blocks:Existing loiyangalani Primary Existing Loiyangalani Secondary Secondary, Existing Titus Ngoyoni primary school Existing Santur Primary school	16,310,000
Ablution blocks in other public places constructed, commissioned and operational	Construct Ablution blocks:Existing cultural site Health Centre Loiyangalani Stadium Baraza Park, Existing Police Station	7,722,123
Sub Total 2	**Ablution Blocks**	**28,652,123.00**
Construction and commissioning of Faecal Sludge Treatment Plant	Construction of 1090m3/year FSTP	13,602,371
	Land for FSTP	25,000,000
	Operation and maintenance of Faecal Sludge Treatment Plant	18,812,256
Sludge emptying, subsidy is 50% of average price of pit emptier		10,900,000
Gazzetted Tarriff and Optimized payments methodology	Develop the tariffs and methodology for management of payments to minimize loss and lateness	600,000
Sub Total 3	**Faecal Sludge Treatment**	**68,914,627.00**
GRAND TOTAL		**181,227,454.00**

Other Project components

The feasibility report presents other Project Components as summarized below in **Table E-4**

Table E-3: Summary of analyzed water supply options

No	**Interventions**	**Output**	**Projected Cost (Kshs)**
1	Introduce gulper and Vaccutugs to service the entire Loiyangalani town	4 number of Gulper/ vacuutug operators identified from among local residents	50,000
		Procure 3 Gulpers	318,600
		Procure 1 Vaccutug	1,805,400
2	Define Standard Operating Procedures (SOPs) for pit emptying services		To be provided
3	Conduct trainings for pit emptiers and award certificates		1,000,000

4.3	A licensing framework for Faecal Sludge Management (FSM) developed and implemented	Develop licences specific to FS handling and treatment	To be provided

E.3 DATA COLLECTION

Primary and Secondary Field data was collected through below listed approach:

(i) Literature review of technical reports
(ii) Transect walk and field observation for potential Environment and Social risks
(iii) Initial and broad assessment of the Project
(iv) Determination of geographical coverage
(v) Identification of relevant Stakeholders (interested and affected parties),
(vi) Significant impacts (areas of study) and the levels of detail required

E.4 LEGAL AND POLICY REGULATORY INSTRUMENTS

E.4.1 Policy and Legal Statutes

Table E-4 below presents relevant policy provisions and legal statutes that were applicable at ESIA assessment stage.

Table E.4: Applicable Policy and Legal Statutes

Statute Category	Specific Statute
Policy Provisions	Constitution of Kenya 2010
	Kenya Vision 2030
	National Environment Policy (NEP) 2013
	HIV and AIDS Policy 2009
	National Land Policy 2009
	Gender Policy 2011
	Kenya National Youth Policy 2006
	Sustainable Development Goals (SDGs) 2015
	National Climate Change Response Strategy 2010
Acts of parliament	EMCA 1999 Cap 387
	Land Act 2012
	Water Act 2016
	Physical and Land Use Development Planning Act 2019
	The Urban Areas and Cities Act 201
	The Public Health Act (Cap.242)
	HIV and AIDS Prevention and Control Act 2011,
	Occupational Health and Safety Act (OSHA 2007),
	Sexual Offences Act 2006,
	Child Rights Act (Amendment Bill) 2014,
	Labour Relations Act 2012
	National Gender and Equality Commission Act 2011,

Statute Category	Specific Statute
African Development Bank's (AfDB) Operational Safeguards (OS) Policies	OS 1: Environmental and Social Assessment
	OS 2: Involuntary Resettlement, Land Acquisition, Population Displacement and Compensation
	OS 5: Labour Conditions, Health and Safety
	OS 4: Pollution Prevention and Control, Greenhouse Gases, Hazardous Materials and Resource Efficiency
	OS 3: Biodiversity and Ecosystem Services

The Project is being financed by AfDB. It was therefore checked against the listed Operation Safeguards (OS) in the following table and appropriate mitigation measures likely to be triggered under each Policy are also provided.

Table E.5: Project Activities Triggering AfDB Operational Safeguards

Policy	Discussions
OS 1: Environmental and Social Assessment.	The Project components will trigger OS 1, the assessment identified that According to OS 1 screening provisions, Loiyangalani Water and Sewerage Project is a **Category 2.** The project is likely to have detrimental site-specific environmental and/or social impacts but can be reversible, and minimized by applying appropriate management and mitigation measures. Mitigation measures for impacts identified are detailed in chapter 9 of this report. Impact identified to be triggered during operation is likely pollution due to spillage during desludging which should be mitigated by ensuring only licensed emptiers desludge and refusal to renew contract for operators who don't adhere to operation procedures which will include health and safety measures . The following is the approach to reduce negative impacts from sanitation facilities to be implemented by the County Government of Marsabit: • Define Standard Operating Procedures (SOPs) for pit emptying services • Conduct trainings for pit emptiers and award certificates • A licensing framework for Faecal Sludge Management (FSM) developed and implemented. • Amend, develop and gazette by-laws/standards to accommodate standardized lined pit atrines, septic tanks and faecal sludge management • Improve compliance monitoring of by-law and standards for FSM and onsite sanitation facilities construction (Ensure only approved lined pit latrines and septic tanks designs are constructed in Loiyangalani Town) - Hire staff dedicated to compliance monitoring for Loiyangalani Town • Branding and safe/improved sanitation awareness campaigns. Develop, initiate and sustain updated branding and local awareness messaging campaign on safely managed sanitation and information on by-laws & standards

Policy	Discussions
OS 2: Involuntary Resettlement: Land Acquisition, Population Displacement and Compensation.	The policy aims to avoid involuntary resettlement where feasible, or minimize resettlement impacts where involuntary resettlement is deemed unavoidable after all alternative Project designs have been explored. For Loiyangalani Water and Sanitation Project, displacement of population is not triggered as pipelines are designed to follow River Riparian and Roads Reserves. In cases where this is not the case, the land was voluntarily donated by the community as is the case for Boreholes area, water management site and faecal sludge treatment plant- However, the Project will impact crops/trees / structures/fences.
OS 3: Biodiversity, Renewable Resources and Ecosystem Services.	The safeguard aims to conserve biological diversity and ecosystem integrity by avoiding or, if avoidance is not possible, reducing and mitigating any adverse environment and social risks. , For Proposed Loiyangalani Water and Sanitation Project, the focus will be on the establishment and enforcement of operation standards that will meet NEMA requirements to ensure no spillage during operations. The treatment method proposed "Faecal Sludge Treatment Plant" will ensure the effluent is treated to the required BOD levels; the measure will be adhered to so that the quality of water is guaranteed for the town dwellers and aquatic ecosystem.
OS 4: Pollution Prevention and Control, Greenhouse Gases, Hazardous Materials and Resource Efficiency.	The Project shall utilize raw materials both during construction and operation phase that could result to pollution of biophysical environment if not handled appropriately. Appropriate mitigation measures for likely waste to be generated by the Project are detailed in chapter 9 of this report. Project activities shall not result to significant amount of greenhouse gases, **Sub Chapter 8.4** provides measures for management of all negative impacts from this project.
OS 5: Labour Conditions, Health and Safety.	The Project shall involve workers both during construction and operation phases of the project. This policy read together with OSHA 2007 shall form integral instruments to be used in ensuring that health, safety and working conditions of both works and community is safeguards. The Labour Relations Act 201 will be applied by labour force on site in addressing disputes related to working conditions.

E.5 STAKEHOLDER ENGAGEMENT

E.5.1 CONSULTATION AT SCOPING STAGE

At scoping stage, stakeholder engagement was done through key informant Interviews (KII) during socio economic surveys. The socio economic survey was conducted in Loiyangalani from the 14th to 17th April 2021. The survey targeted household heads within 14 villages in Loiyangalani Location and 1 village in El Molo. Further, a public meeting was organized with El Molo Elders on the 14th April 2021.

In the meeting, the objective of the survey was discussed and dates of actual field survey confirmed. The main focus was a discussion on water and sanitation challenges. Further, the sample frame was derived from the Households Heads who attended the meeting as indicated in **Table E.6** below.

Table E.6: Distribution of Households Heads

Village	Location	Household Heads	Date of Survey
Nahagan	Loiyangalani	14	15th and 16th April 2021
Kiwanja	Loiyangalani	14	15th and 16th April 2021
Kula Mawe	Loiyangalani	14	15th and 16th April 2021
Kula Pesa	Loiyangalani	14	15th and 16th April 2021
St.Martin	Loiyangalani	14	15th and 16th April 2021
Kula Samaki	Loiyangalani	14	15th and 16th April 2021
Kilimambogo	Loiyangalani	14	15th and 16th April 2021
Soweto	Loiyangalani	14	15th and 16th April 2021
Town	Loiyangalani	14	15th and 16th April 2021
Dikilkimat	Loiyangalani	14	15th and 16th April 2021
Nawapa	Loiyangalani	14	15th and 16th April 2021
Nakwamekwi	Loiyangalani	14	15th and 16th April 2021
Achukule	Loiyangalani	14	15th and 16th April 2021
Nawoitorong	Loiyangalani	14	15th and 16th April 2021
Komote	El-Molo	16	15th and 16th April 2021
Total		**212**	

E.5.2 PUBLIC MEETINGS AT ESIA STAGE

During the ESIA Stage a public barasa was organized by the Loiyangalaini Chief on the 23rd of June 2022 at the Chiefs Hall where 17nr participant attended. Another similar meeting was held at Palm Shade Resort Hall on 21st February 2024. **Table E.7** below presents a summary of Stakeholder Concerns that were discussed in the public meetings of the 23rd of June 2022 and 21st February 2024 at Loiyangalani Chiefs Hall. The Minutes of these meting are attached in the appendices.

Table E.7: Summary of Stakeholders Concerns

Suggestion / Question	Response
Stakeholders wanted to know if at all water will be available this time since pipes were laid previously by other projects but water has never flowed.	The meeting was informed that this time the project design has been done properly which includes the expansion of the treatment plant to treat an additional 2000 cubic meters of water per day. This additional volume will ensure water is available to all residents within the project area.
Residents wanted to know if there will be household connections done under the project.	The meeting was informed that the aim of the Government is to bring services closer to the people. The water line will be brought as close as possible to residents. However, residents will be expected to apply through Marsabit Water and sanitation Company in order to get a connection. The county government of Marsabit should also come on board and ensure distribution lines are extended progressively to residents who will be far away from the main line. It was also agreed that residents can be pooled together into villages and a T- Junction provided to supply them with water.

Suggestion / Question	Response
Residents also wanted to be informed about what can be done to protect their natural springs that are being destroyed by private developers.	Stakeholders were assured that a borehole would be drilled so as to try and conserve the water from Springs. The chief also suggested an untapped source called Mowolkiteng source which had great potentials.
Residents wanted to know if the contractor would source for workforce within the community where the works will be implemented.	Residents were informed that all unskilled labour and some skilled will be sourced from the local community. Youths were encouraged to organize themselves into groups and avail themselves for consideration.
Ablution Blocks	The community's representatives were happy to hear that ablution blocks will be provided in public places. They affirmed their willingness to donate land for the public ablution blocks wherever the project proposed to locate them. They requested that all public institutions be given priority on water distributions and ablution blocks, including schools, health facilities, polytechnic facilities, police stations, slaughterhouses, and any other institutions. They proposed that the ablution blocks be constructed to be flushable toilets with proper lighting systems as this will reduce the filling up of the toilets.
Community Expectations	The Community representatives listed their expectations upon commencement and completion of the project as follows: • Clean and sufficient water for human consumption • Reduction of waterborne diseases • Bigger population benefits and access to water easily • Standardized faecal disposal system • Better infrastructure (roads, schools, markets) • Proper piping (quality pipes) to prevent breakages and leakages
Other Clarifications	• The meeting was informed that cattle troughs will be provided through this project. • They were also informed that the County Government of Marsabit will operate and maintain the water and sanitation facilities. • They were informed that the financing model for the Operation and Maintenance phase will depend on the financing model for the project's construction.

E.6 SITE BASELINE INFORMATION

Administrative Baseline of Loiyangalani town is summarized below.

- Loiyangalani is located over 250km away from Marsabit town in a zone classified as an

oasis near the eastern shows of Lake Turkana. The town is between 2010' and 20 40' North of Equator and between 360 10' E of Greenwich meridian and the Lake Turkana shore, at an altitude of about 370m above sea level.

- Loiyangalani is located in Laisamis Constituency, the town is located on the southeastern coast of Lake Turkana in Kenya. The town has a population of approximately 5,117 according to the 2019 census.
- The town is a sub-county in Marsabit County and is few divisions and villages. The targeted study area included 15 villages from two different Sub-locations, namely Loiyangalani and El-Molo. The villages were Nahagan, Kiwanja, Kulamawe, Kulapesa, Kulasamaki, St. Martin, Town, Soweto, Kilimambogo, Dikilkimat, Nawapa, Nakwamekwi, Achukule, Nawoitorong and Komote Village.
- Komote Village is an Island in Lake Turkana approximately 7kms from the town. Its people mostly the young ones are greatly affected by the water from the Lake which isn't safe for human consumption without treatment. The place also is the habitat of the El-Molo people who are a tourist attraction being the among smallest tribe in the Kenya

Biophysical Baseline of Loiyangalani town is summarized below.

- The climatic conditions prevailing in the project area and other areas of the Marsabit County are summarised in the following table. The climate is basically hot and very dry. The whole of the project area belongs to what is referred to as Agro-climatic Zone VII. This zone is characterised by very low rainfall and very high evapotranspiration
- The area is semi-arid and annual rainfall is estimated to less than 250mm. However, the annual rainfall fluctuates widely with a maximum of about 500mm to a minimum of about 25mm, with most rain falling between March and May.
- The mean monthly temperature of Loiyangalani are in the range of 27 - 29oC, the mean minimal lie around 13^0 – 20^oC while the mean maxima are 26^0 – 35^oC, though some areas in Loiyangalani record as high as 40^oC.
- Around Loiyangalani Township and bordering Lake Turkana the topographical features are mainly dissected lacustrine plain, floodplain and piedmont plains. The plains have a relief intensity of 5-20 and slopes of 0-8%. The relief of the plains ranges from flat to very gently undulating, gently undulating and undulating.
- The area is generally covered by sandy soils to gravely rounded particles that portray lacustrine origin which are in turn underlain by basaltic lava. The shores of two existing islands in the lake are made up of lava flows which depict pillow lavas suggesting the lava flew into formerly a larger lake which diminished due to successive lava flows. The hilly ridges are a result of successive lava Basaltic flows. The soils are sandy to gravely round that portray lacustrine origin.
- Occurrence of surface water is very rare in the project area. Only after heavy rains, shallow pools and seasonal water courses may be filled with water for a few and probably up to a maximum of a few weeks. The drainage ways in the project area are dry river beds referred to as laggas. These drainage ways have boulders and stony riverbeds. Many laggas in the project area seem to be too wide for the existing climatic conditions. They have wide beds with braided characteristics and changing stream channels.

Social Baseline of is summarized below.

- Loiyangalani Town and Komote Village, the target of this assessment is located within Loiyangalani Sub County, Loiyangalani Location. The Town is divided into 14 villages with approximate population1 of 5,486 persons and Komote village with an approximate population of 306 persons
- Most of the land in the county is owned communally except a few adjudicated sections in Saku and Moyale constituency. The mean holding size of adjudicated sections is 0.8ha, which is slightly low compared to the national mean holding of 0.97ha per household. Land adjudication has started in some areas and plans are underway to roll out the adjudication exercise countywide
- The settlement patterns around the town is highly dispersed and scattered, primarily influenced by access to water, land productivity, proximity to roads and other services like security. Thus most settlements are mainly found in areas of relative potential, availability of water, pastures, security and other social services
- The town has two main health care facilities that is the Loiayangalani Health Centre, which is a Public facility and Catholic Mission Health Centre. On your way to El- Molo bay there exist a small dispensary serving the people of Komote Village.
- The town has poor road network which mostly become impassable when it rains heavily, However, within some areas are partly upgraded to marram by Marsabit County Government while other are not. Way-leave reserves for these roads will provide land upon which the water lines and sewer lines will be constructed.
- Loiyangalani Town has 3 public primary schools, 1 secondary Public school and 1 public primary school in El-Molo Bay

E.7 SENSITIVE RECEPTORS

At ESIA stage, **Table E-8** below list receptors that were identified as the ones that would be susceptible to environment and social impacts or risks associated with the Project during construction stage.

Table E-8: Receptors within Loiyangalani Town and El-Molo

Social Receptor	Nature of Receptor	GPS Coordinates
Loiyangalani Market	Market	N 02°45.655’ E 036°43.050’
Mowolkiteng	Water Point	37 N 0250289 UTM 0302230
Lardapash	Water Point	37 N 0251913 UTM 0301483
Majimoto Springs	Water Point	37 N 0246911 UTM 0305043
Kiwanja Springs	Community Water Point	37 N 0246914 UTM 0305776
Ngoboleng Spring	Community Water Point	37 N 0249828 UTM 0308637
Nowoitorong Spring	Community Water Point	37 N 0246281

[1] *Source: Second Marsabit County Integrated Development Plan (CIDP 2018-2022)*

		UTM 0302268
Naagan village Spring	Community Water Point	37 N 0246846 UTM 0305396
El Molo Bay Dispensary	Health Centre	N 02°51.381' E 036°42.004'
Catholic Mission Dispensary	Health Centre	N 03°23.215' E 038°33.555'
Loiyangalani Health Centre	Health Centre	N 02°45.806' E 036°43.328'
Loiyangalani Jamia Mosque	Mosque	
Loiyangalani Catholic Church	Church	N 02°45.194' E 036°43.194'
P.A.G – Pentecostal Assemblies of God Loiyangalani	Church	
S.D.A Loiyangalani	Church	
Full Gospel Church of Kenya	Church	
Loiyangalani Vocational Training College	School	N 02°46.681' E 036°42.963'
Titus Ngoyoni Primary School	School	N 02°46.042' E 036°43.460'
Loiyangalani Primary School	School	S 02°45.178' E 036°43.230'
Loiyangalani Secondary School	School	N 03°22.961' E 039°34.035'
Santur Primary School	School	N 02°44.939' E 036°42.848'
El Molo Bay Primary School	School	N 02°51.562' E 036°42.085'

E.8 ENVIRONMENT AND SOCIAL IMPACTS IDENTIFICATION

The **Environment and Social impact identification** and analysis done at ESIA stage using the Leopold matrix. The matrix is a qualitative environmental impact assessment method pioneered in 1971 and used to identify the potential impact of a Project on the environment. The matrix is a grid that is used to identify the interaction between Project activities, which are displayed along one axis, and environmental characteristics, which are displayed along the other axis.

The impact rating evaluation will summarized the key areas related to the extent of the impact, timing of occurrence of the impact, intensity of the impact and probability of the impact as explained in **Table E.9.**

Table E.9: Impact Rating Variables

Impact Rating	Explanation
Extent	An area of influence covered by the impact, if the action produces a much-localized effect within the space, it is considered that the impact is **low (1).** If, however, the effect does not support a precise location within the project environment, having a pervasive influence beyond the project footprint, the impact will be at location **level (3)** or could be **Beyond County (5)**

Timing:	Refers to the moment of occurrence, the time lag between the onset of action and effect on the appearance of the corresponding factor, classified in five categories from a weight of (1) which implies short term to a weight of (5) which implies permanent.
Intensity	Refers to the degree of impact on the factor, in the specific area in which it operates, ranked from low (1) to high (5).
Probability	Refers to the likelihood of the impact occurring during the project implementation, this is also ranked as probable to highly probable.

Impact severity will be determined based on the capacity of the receptor to sustain shocks triggered by the impact. In this regard the impact severity could be termed as negligible, low, medium or high as summarized in **Table E.10** below**.**

Table E.10: Impact Severity

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

For effective impact identification, the environment characteristics will be assigned weights based on the severity of environment impacts (Leopold, 1971) as detailed in **Table E.11** below.

Table E.5: Impact Rating Criteria for Environment and Social Risks

Extent		Duration		Intensity		Probability		Weighting Factor (WF)		Severity Rating (SR)		Mitigation efficiency	
Foot print	1	Short term	1	Low	1	Probable	1	Low	1	Low	0-19	High	0,2
Site (1km radius)	2	Short to medium	2			Possible	2	Low to Medium	2	Low to Medium	20-39	Medium to High	0,4
Location	3	Medium term	3	Medium	3	Likely	3	medium	3	medium	40-59	medium	0,6
Sub County	4	Long term	4			Highly likely	4	Medium to high	4	Medium to high	60-79	Low to medium	0,8
Beyond County	5	Permanent	5	High	5	High	5	High	5	High	80-100	low	1,0

A summary of impact significance discussed at **ESIA stage** is presented in **Table E.12 below.**

Table E.6: Impact Significance Assessment

Environmental / Social Variable	Phase	Impact Type	Severity Rating	
			Before Mitigation	After Mitigation
Impacts on Flora and Vegetation Cover	Construction	Direct	Minor	Negligible
Impact on Water Resources	Construction & Operation	Direct	Minor	Negligible
Impacts on Soil Resources	Construction	Direct	Minor	Negligible
Impact on Air Quality	Construction	Direct	Moderate	Negligible
Noise and Vibration Impacts	Construction	Direct	Minor	Negligible
Community Health and Safety	Construction	Direct	Moderate	Minor
Workers Health and Safety	Operation	Direct	Moderate	Minor

E.9 Environmental and Social Risk Management Plan at Construction Stage

Table E.13 below presents a summary of Environmental and Social Risks Management Plan at Construction Stage.

Table E.7: Environment and Social Risks Management Plan at Construction Stage

RISK	MITIGATION
Impacts on Water Resource	● All waste water which may be contaminated with oily substances must be managed in accordance with an appropriate Waste Management Plan (WMP). ● No hydrocarbon-contaminated water may be discharged to the environment or into storm water channels. . ● At construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which included among other; Soil and Sedimentation Control Plan, Spoil Management Control Plan and Waste Management Plan.
Impacts on Soil Resource	● Vegetation clearing and topsoil disturbance will be minimized. ● Contour temporary and permanent access roads / laydown areas so as to minimize surface water runoff and erosion. ● Sheet and rill erosion of soil shall be prevented where necessary through the use of sand bags, diversion berms, culverts, or other physical means. ● Topsoil shall be stockpiled separate from subsoil. Stockpiles shall not exceed 2 m height, shall be located away from drainage lines, shall be protected from rain and wind erosion, and shall not be contaminated. ● Wherever possible construction work will take place during the dry season. ● Topsoil shall be evenly spread across the cleared areas when reinstated.

RISK	MITIGATION
	● Accelerated erosion from storm events during construction shall be minimized through managing storm water runoff (e.g., velocity control measures). ● Soil backfilled into excavations shall be replaced in the order of removal in order to preserve the soil profile. ● Spread mulch generated from indigenous cleared vegetation across exposed soils after construction ● At construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which included among other; Soil and Sedimentation Control Plan, Spoil Management Control Plan and Waste Management Plan.
Impacts on Air Quality	**As general measures for all locations:** ● Develop a Dust Management Plan (DMP); ● Record all dust and air quality complaints, identify cause(s), take appropriate measures; ● Liaise with local communities to forewarn of potentially dusty activities; ● Undertake monitoring close to dusty activities, noting that this may be daily visual inspections, or passive/active monitoring as parameter ● Undertake inspections to ensure compliance with the Dust Management Plan; ● Plan potentially dusty activities so that these are located as far from receptors as feasible; ● Erect solid screens if feasible around stockpiles and concrete batching; ● Avoid run off of mud and water and maintain drains in a clean state; ● Remove dusty materials form site as soon as possible if not being re-used. If being re-used, cover or vegetate if possible; ● Impose speed limits on haul routes and in construction compounds to reduce dust generation; ● Minimize drop heights when loading stockpiles or transferring materials; and ● Avoid waste or vegetation burning. **For traffic on unpaved roads:** ● Undertake watering to attenuate dust near sensitive receptors. The duration and frequency of this should be set out in the Dust Management Plan and will consider water availability and any stakeholder grievances; and ● On unpaved roads in use for more than 1 month, consider use of surface and sealants to reduce the use of water and water trucks. Use of lignin-based sealants recommended due to low environmental toxicity. **For excavations and levelling** ● Revegetate exposed areas as soon as feasible; ● Revegetate or cover stockpiles if feasible; ● Expose the minimum area required for the works, and undertake; and exposure on a staged basis to minimize dust blow.

RISK	MITIGATION
Noise and Vibrations Impacts	● Siting noisy plant and equipment as far away as possible from human settlement, and use of barriers (e.g., site huts, acoustic sheds or partitions) to reduce the level of construction noise at receptors wherever practicable; ● Where practicable noisy equipment will be orientated to face away from the nearest Human settlement and other receptors; ● Working hours for significant noise generating construction work (including works required to upgrade existing access roads or create new ones), will be daytime only; ● Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, will be used, where practicable; ● Where practicable, stationary equipment will be located in an acoustically treated enclosure; ● For machines with fitted enclosures, doors and door seals will be checked to ensure they are in good working order; also, that the doors close properly against the seals; ● Throttle settings will be reduced and equipment and plant turned off, when not being used; ● Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked; and fitting of mufflers or silencers of the type recommended by manufacturers.
Impacts on vegetation cover	● Avoidance of impacts should be prioritized. However, if not possible then compensatory planting of trees that will be cut by the contractor during works will be undertaken. ● Vegetation shall only be within the well field's only if the vegetation and will interfere with Project construction and/or present a hazard. ● Areas to be cleared shall be agreed and demarcated before the start of the clearing operations to minimize exposure. ● The use of existing cleared or disturbed areas for the Contractor's office, stockpiling of materials etc. shall be encouraged. ● Whenever possible, all damaged areas shall be reinstated and rehabilitated upon completion of the contract to as near pre-construction conditions as possible. ● Rehabilitation of temporary construction sites and pioneer camps (if needed) should be done as swiftly as possible and always with suitable native grasses and other plants
Community Health Safety and Security Impacts	● Contractor will develop and monitor the implementation of a Community Health and Safety Management Plan (CHSMP) ● Contractor will develop Emergency Response Plans (ERPs) in cooperation with local emergency authorities and hospitals. ● Contractor will extend the Worker Code of Conduct to include guidelines on worker –community interactions and will provide training on the worker code of conduct to all employees including drivers as part of the

RISK	MITIGATION
	induction process. ● Contractor will provide primary health care and first aid at construction office sites to avoid pressure on local healthcare infrastructures. ● Contractor will implement a Community Grievance Mechanism. ● Contractor will develop and implement a Traffic Management Plan covering aspects such as vehicle safety, driver and passenger behaviour, use of drugs and alcohol, operating hours, rest periods, community education on traffic safety and accident reporting and investigations.
Worker Health and Safety and Workers Management impacts	● Contractor and self-employed contractors will assess the H&S risks related with the tasks to be performed during the construction phase. ● Contractor will ensure that training on health and safety measures is provided to all construction workers prior to starting to work on the Project and that supervisors have adequate experience to deliver on their responsibilities. ● Contractor will implement regular health and safety checks and audits of workers, and subcontractors and implementing sanctions in case of breaches of national standards and the Project's specific standards. Such audits to include workplace H&S; worker contracts, working hours, pay and conditions; housing and food standards. ● Contractor will establish a procedure for the recording and analysis of incidents and lessons learned such that additional actions can be implemented to avoid or minimize occupational health and safety risks. ● Contractor will ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents. ● Contractor will ensure that adequate clean water, adequate food and access to medical care is provided to all workers on the worksite and at accommodation. ● Contractor will develop and implement a Traffic Management Plan covering aspects such as vehicle safety, driver and passenger behaviour, use of drugs and alcohol, operating hours, rest periods, community education on traffic safety and accident reporting and investigations.
Gender-based violence and Sexual Harassment	● Ensure clear human resources policy against sexual harassment that is aligned with national law ● Integrate provisions related to sexual harassment in the employee Code of Conduct (CoC) ● Ensure appointed human resources personnel to manage reports of sexual harassment according to policy ● The Contractor shall require his employees, sub-contractors, and any personnel thereof engaged in construction works to individually sign and comply with a Code of Conduct with specific provisions on protection from sexual exploitation and abuse ● The contractor will implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including: - effective and on-going community engagement and consultation,

RISK	MITIGATION
	particularly with women and girls; - Review of specific project components that are known to heighten GBV risk at the community level, e.g., compensation schemes; employment schemes for women; etc. ● the contractor shall develop specific plan for mitigating these known risks, e.g., sensitization around gender-equitable approaches to compensation and employment; etc. ● The contractor will ensure adequate referral mechanisms are in place if a case of GBV at the community level
Sexual Exploitation and Abuse by project workers against community members	● Develop and implement a SEA action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018). ● The SEA action plan will include how the project will ensure necessary steps are in place for: - Prevention of SEA: including CoCs and ongoing sensitization of staff on responsibilities related to the CoC and consequences of non-compliance; project-level IEC materials; - Response to SEA: including survivor-centered coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management; - Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; community-level Information Education and Communication (IEC) materials; regular community outreach to women and girls about social risks and their PSEA-related rights; ● Management and Coordination: including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle blower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers.
Spread of communicable diseases and HIV/AIDS	● Sensitize workers and the surrounding communities on awareness, prevention and management of HIV/AIDS and sexual health and rights through staff training, awareness campaigns, multimedia and workshops or during community Barazas. ● Use existing clinics to provide VCT services to construction crew and

RISK	MITIGATION
	provision of ARVs for vulnerable community members ● Ensure safety of women and girls in provision of VCT services. ● Work to minimize or altogether eliminate mosquito-breeding sites.
Spread of COVID -19 amongst workers	● The Contractors will develop a SOPs for managing the spread of Covid-19 during project execution and submit them for the approval of the Supervision Engineer and the Client before mobilization. The SOPs shall be in line with the World Bank guidance on COVID-19, Ministry of Health Directives and site-specific project conditions; ● Mandatory provision and use of appropriate Personal Protective Equipment (PPE) shall be required for all project personnel including ● Avoid concentrating of more than 100 workers at one location. Where there are two or more people gathered, maintain social distancing at least 2 meters. All workers and visitors accessing worksites every day or attending meetings shall be subjected to rapid Covid-19 screening which may include temperature check and other vital signs; ● Install handwashing facilities with adequate running water and soap, or sanitizing facilities at entrance to work sites including consultation venues and meetings and ensure they are used; ● Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails etc;

E.10 Statutory Requirements for Water Treatment Plant and Faecal Sludge Treatment Plant

The Occupational Health and Safety Act (OSHA 2007) provides below detailed statutory provisions to be complied with before commission and operation of a Water Treatment Plant (WTP) and Faecal Sludge Treatment Plant.

Table E.8: Statutory Requirements for Water Treatment Plant and Faecal Sludge TreatmentFacility

Activity	Requirement	Conformity Measure
Registration of the Water Treatment Plant as Works Place with DOSH	OSHA 2007 requires that any workplace with more than 7 employees should be registered as a workplace	*Register the Proposed Augmented Ngobeleng Water Treatment Plant and Loiyangalani Faecal Sludge Treatment Plant as Workplace with DOSH*
Duties Of Occupiers (Legal Requirements)	• Risk Assessment • Safety and Health Audit • Fire Safety Audit • Initial Environment Audit	*Undertake Risk Assessment, Safety and Health Audit and Fire Safety Audit for Ngobeleng Water Treatment Plant and Loiyangalani Faecal Sludge Treatment Plant*
Management of Polices required at the Water Works	Policies Required: • Safety & Health Policy • Fire Safety Policy • Environment Policy	*Prepare Safety & Health Policy, Fire Safety Policy and Environment Policy Ngobeleng Water Treatment Plant and Loiyangalani Faecal Sludge Treatment Plant*
Water Works Personnel Trainings Required	Training required: • Statutory: Fire marshal training	*Establish of Health and Safety Committee for Ngobeleng Water Treatment Plant and Loiyangalani Faecal Sludge Treatment Plant and train them on;* • *Statutory Fire marshal training*
	Training required: • Statutory: First Aid Training	

Activity	Requirement	Conformity Measure
	Training required: • Statutory: Safety and Health Committee	• *Statutory First Aid Training* • *Statutory Safety and Health Committee training on Occupational Health and Safety (OSH)* • *Regular provision of personnel at the T/Works with Appropriate (PPEs)*

E.11 Operation Stage Environment and Social Management Plant for Water Treatment Plant

At operation stage, the WTP Operator will ensure the following measures are implemented during operation of the WTP.

Table E.9: Operation Stage Environment and Social Management Plant for Water Treatment Plant

Activity Fields	Requirement
Approval, Authorization And Permits	WTP Operator should apply and renew water Abstraction permit for Ngobeleng Water Treatment Plant from WRA, activities under in are listed under the Six Schedule of the Rules.
Control of Pollution and Water Quality Requirements	**Management of Reagents** For Ngobeleng Water Treatment Plant, PDR has provided for a well ventilated and proper lighting chemical storage house. Further, personnel handling the reagents will be provided with appropriate PPEs such as gloves, nose masks and googles to protect them from the chemical. Also procurement of reagent will be done in batches with enough doses to eliminate the risk of some of the reagent expiring therefore requiring disposal.
	Management of Sludge PDR provides for sludge drying beds, the beds provide allow for sludge dewatering and allow for easy handling and evacuation
Water Use Charges	A master meter has been installed at the raw water inlet chamber to measure the water abstraction volume for the purpose of calculating amount due for payment of water services to Water Resources Authority (WRA)
Conservation of Riparian	The Water Rules 2007, Part ix on Conservation of Riparian and Catchment Areas regulation 120.(1) provides that for the purposes of conserving the catchments and riparian areas, the authority may by order or state as a condition on an authorization or permit, require a person to prepare and conform to a Soil and Water Conservation Plan (SWCP). In compliance with this regulation, a forestation program in liaison with Kenya Forest Services (KFS) will be initiated within the WTP and FSTP peripheries. WTP Operator will upscale this initiative after commissioning of the Plant.

E.12 Operation Stage Environment and Social Management Plant for the Faecal Sludge Treatment Plant

The Environmental and Social Management Plan during operation of the Faecal Sludge Treatment Plant is presented below.

Table E.10: Operation Stage Environment and Social Management Plant for Sewerage Treatment

Issue	Action required
Odour Menace from Wastewater Treatment Works	• Maintain appropriate covering/ventilation of the pre-treatment unit, appropriate handling and removal of grit/grease • Ensure scum is appropriately disposed-off or properly stabilized and adequate water flow and aeration to reduce the potential of odour formation • The perimeter of the proposed site should be vegetated with trees and plants of varying heights thereby forming windbreaker and reduce dispersion of odour • Repairing of dilapidated the roofs of the sludge drying beds to ensure quick drying of sludge and appropriate disposal to reduce odour emanating from wet sludge.
Risks Associated with handling of Sludge at the facility	• Dried sludge could be used to make briquettes as a charcoal substitute or be sold to farmers as fertilizers • Excess sludge can be disposed of in a designated landfill which shall only be for disposing dry odourless sludge. • Preparation and enforcement of operational guidelines for sludge management by Marsabit County Government
Solid Wastes Impacts at FSTP Screens	• Develop a comprehensive Waste Management Plan (WMP) for the management of solid wastes from screen chambers • Employ personnel who will be in charge of maintaining hygiene and cleanliness of the FSTP including removal of solid wastes from screen chambers • Properly labelled and strategically placed waste disposal containers shall be provided at all places within the FSTP • Solid wastes once removed from screens shall be collected and disposed-off appropriately as required by Waste Management Regulations of (2006) and Marsabi County Government by laws.

E.13 RECOMMENDATION

The ESIA makes below listed provisions:

- The Environment and Social Management Plan (ESMP) prepared under this ESIA assessment recommends provision of a budget of Kenya Shillings Two Million, Eight Hundred and Fifty Thousand (Kshs 2,850,000) for mitigation of environment and social impacts identified in this Report. The Bid Documents to be prepared for the project should incorporates the Environment, Social provisions discussed herein (Environment and Social Impact Assessment and Mitigation Measures).
- From the screening assessment, the project components discussed in this report will not trigger land acquisition and therefore not RAP was prepared. This is because road reserves and wayleaves are free from encroachment and are wide enough to accommodate water the proposed project components. Further, Land in Loiyangalani is majorly community land, therefore the project proponent and land owners will sign voluntary land donation forms appended to this ESIA as appendix 6.
- Project Contract Document to include provisions for the Contractor for preparing and implementing Construction Environment and Social Management Plan (C-EMSP), annexes to the C-EMSP will include but not limited to: Soil and Sedimentation Control Plan, Spoil Management Control Plan, Dust Management Plan, Health, Hygiene and Safety Plan, Labour Management Plan, Child Protection Strategy, Gender-based Violence

Action Plan, Waste Management Plan, Contractors Code of Conduct, Gender Inclusivity Strategy , HIV/Aid Prevention Strategy. The contractors will be required to engage services of a qualified Environment, Health and Safety Officers and Social Safeguards Officer at the time of Project implementation.

- At Project implementation stage, the contractor with approval of the supervising engineer will prepare periodic Environmental and Social Implementation Report. The reports will provide status of implementation of risks & impacts management measures to date from the project start to the end of the reporting period. From an occupational Health and Safety approach, the contractors will ensure they undergo the following; (OSH) risk assessment, Registration of workplaces, Safety and Health (OSH) Audit, Fitness to work assessment of employees, Training of all workers or workers' representatives in basic Occupational Safety and Health, Accident and incident reporting, Compensation of injured workers who die or get injured and disabled and Examination of Safety Plants and Equipment.
- At Project completion stage, within the Defects Liability Period, Marsabit Water and Sanitation Company will initiate an Initial Environment and Social Audit for the Project as required by EIA/EA Audit Regulations of the year 2003 and subsequent annual self-audits. The Audit will develop an Environment and Social Audit Action Plan (ESAAP) that will be used to track Project Environment and Social Compliance during Project implementation stage

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LIST OF ABBREVIATIONS

AoI		Area of Influence
EAC		East African Commission
EADB		East African Development Bank
ESDD		Environment and Social Due-diligence
EBRD		European Bank of Reconstruction & Development
BoD	-	Biological Oxygen Demand
CITES		Convention on International Trade on Endangered Species
C-ESMP		Construction – Environment and Social Management Plan
CoC		Code of Conduct
GEF		Global Environment Facility
GASIAPOA		Local Community Based Organization involved in pit emptying
DMP		Dust Management Plan
EHS		Environment Health and Safety
EA	-	Environmental Assessment
EIA		Environment Impact Assessment
EMCA	-	Environment Management & Coordination Act
ESMP		Environment and Social Management Plan
IWRMP		Integrated Water Resources Management Program
IBA		Important Bird Area
IFC		International Finance Cooperation
ILO		International Labour Organization
HPI		High Priority Investment
LVEMP		Lake Victoria Environment Management Project
LVBC		Lake Victoria Basin Commission
KeNHA		Kenya National Highways Authority
KeRRA		Kenya Rural Roads Authority
KURA		Kenya Urban Roads Authority
NBI		Nile Basin Initiative
NEMA	-	National Environmental Management Authority
NOx		Sulphur Oxides
SOx		Nitrogen Oxides
OSHA	-	Occupational Health & Safety Act
Pm		Particulate Matter
PPE		Personal Protective Equipment
PDR		Preliminary Design Report
TGA		Target Group Analysis
TMP		Traffic Management Plan
VOC		Volatile Organic Compounds
WASH		Water Sanitation Hygiene
WASUP		Water Sanitation and for the Urban Poor
FSTP		Waste Water Treatment Plant
WRA		Water Resources Authority
WMP		Waste Management Plan

CHAPTER 1: BACKGROUND INFORMATION

1.1 Project Objective:

The main objective of the project is to significantly improve the water and sanitation infrastructure in Loiyangalani Town, ensuring that residents have access to safe and sustainable water sources and sanitation facilities until 2045. This includes addressing the current challenges of limited water sources, contaminated water from Lake Turkana, lack of fecal sludge or Wastewater Treatment, and inadequate toilet facilities leading to open defecation. The project aims to enhance the quality, quantity, and sustainability of water services by increasing the absorbed capacity of distribution networks and designing infrastructure to meet current and future water demands in the town.

1.2 Project Justification:

Loiyangalani Town is situated in an arid region characterized by scarce water resources. Despite its proximity to Lake Turkana, the water is unfit for domestic use due to elevated levels of contaminants, including Total Suspended Solids, Sodium, Chloride, Fluoride, Total Dissolved Solids, and Chromium, the latter being particularly concerning due to its carcinogenic properties. The absence of fecal sludge or Wastewater Treatment facilities has resulted in environmental pollution and health risks, exacerbated by the inadequate provision of toilets and latrines, leading to open defecation.

The project is crucial to improve public health and environmental sustainability in Loiyangalani Town. By providing safe and sustainable water and sanitation services, the project will help prevent waterborne diseases and improve the overall quality of life for residents. Additionally, the project aligns with the Government of Kenya's efforts to achieve the Sustainable Development Goals (SDGs), particularly Goal 6 which aims to ensure availability and sustainable management of water and sanitation for all.

1.3 Project Proponent

The Project Proponents are The Northern Water Works Development Agency (NWWDA) and the Tana Water Works Development Agency (TWWDA).

a) Northern Water Works Development Agency (NWWDA):

- NWWDA is a state corporation under the Ministry of Water, Sanitation, and Irrigation in Kenya.
- Its mandate includes the development, maintenance, and management of water and sanitation infrastructure in the northern region of Kenya.
- NWWDA is responsible for implementing water supply projects, improving access to clean water, and promoting sustainable water management practices.
- The agency collaborates with various stakeholders, including government agencies, NGOs, and community organizations, to achieve its objectives.
- NWWDA plays a crucial role in addressing water scarcity and improving water quality in arid and semi-arid areas of northern Kenya.

b) Tana Water Works Development Agency (TWWDA):

- TWWDA is also a state corporation under the Ministry of Water, Sanitation, and Irrigation in Kenya.

- Its primary mandate is to develop, maintain, and manage water and sanitation infrastructure in the Tana River basin and its environs.
- TWWDA is responsible for implementing water supply projects, managing water resources, and promoting water conservation practices in the region.
- The agency works closely with local communities, government agencies, and other stakeholders to ensure sustainable water management and improve water access in the Tana River basin.
- TWWDA's efforts contribute to the government's goal of achieving universal access to clean water and sanitation services in Kenya.

Both NWWDA and TWWDA play vital roles in addressing water and sanitation challenges in Kenya, particularly in arid and semi-arid areas. Their collaboration on projects like the Loiyangalani Town Water Supply and Sanitation Project demonstrates their commitment to improving water access and sanitation services for all Kenyan communities.

1.4 Project Financier

In the context of the Loiyangalani Town Water Supply and Sanitation Project, the AfDB's involvement as a financier underscores its commitment to supporting infrastructure development and improving access to basic services, such as water and sanitation, in Africa. The AfDB's financing for the project will help address the water and sanitation challenges faced by the residents of Loiyangalani Town, contributing to improved health, livelihoods, and overall quality of life in the area.

he African Development Bank (AfDB) is a multilateral development finance institution that focuses on improving economic and social development in African countries.

1.5 ESIA Objectives

An Environmental and Social Impact Assessment (ESIA) is a critical process undertaken before the implementation of development projects to assess the potential environmental and social effects of the project. The objectives of an ESIA are to identify, predict, and evaluate the potential impacts of a proposed project on the environment and affected communities, and to propose measures to mitigate or manage these impacts.

The specific objectives of this ESIA for the Loiyangalani Town Water Supply and Sanitation Project include:

1. Identification of Potential Impacts: Identify all potential environmental and social impacts that may result from the project, including impacts on air, water, soil, biodiversity, human health, and socio-economic conditions.
2. Assessment of Significance: Assess the significance of identified impacts, considering factors such as the scale, duration, and reversibility of impacts, as well as the sensitivity and resilience of affected ecosystems and communities.
3. Mitigation and Management Measures: Propose measures to mitigate or manage adverse impacts, aiming to prevent, minimize, or offset negative effects and enhance positive impacts.
4. Enhancement of Positive Impacts: Identify opportunities to enhance positive impacts of the project, such as job creation, infrastructure development, and improvement of living standards for local communities.

5. Stakeholder Engagement: Engage stakeholders, including local communities, government agencies, non-governmental organizations, and other interested parties, in the decision-making process. This includes consultation, information sharing, and participation in impact assessment and decision-making.
6. Compliance with Legal and Regulatory Requirements: Ensure that the proposed project complies with relevant laws, regulations, and standards related to environmental protection and social sustainability.
7. Monitoring and Evaluation: Establish a framework for monitoring and evaluating the implementation of mitigation and management measures to ensure that they are effective in reducing impacts and achieving project objectives.

Overall, the objective of this ESIA is to provide decision-makers with comprehensive information on the environmental and social implications of the Loiyangalani Town Water Supply and Sanitation Project, enabling them to make informed decisions that promote sustainable development and minimize negative impacts on the environment and communities.

1.6 ESIA Scope

The ESIA for the Loiyangalani Water and Sanitation Project will encompass the following key areas to assess and mitigate environmental and social impacts throughout the project lifecycle:

1. Pre-construction Phase:
   - Assessment of potential impacts on land use, biodiversity, and water resources from project components such as borehole drilling, pipeline construction, and establishment of treatment facilities.
   - Identification of potentially affected communities, including their socio-economic characteristics and cultural heritage.
   - Evaluation of potential air and noise pollution during construction activities.
   - Development of a comprehensive Environmental and Social Management Plan (ESMP) to mitigate identified impacts.

2. Construction Phase:
   - Implementation of the ESMP to minimize environmental and social impacts during construction.
   - Monitoring of construction activities to ensure compliance with environmental and social standards.
   - Management of waste and hazardous materials generated during construction.
   - Establishment of grievance mechanisms to address community concerns.

3. Post-construction Phase:
   - Monitoring and evaluation of the project's environmental and social performance after completion.
   - Assessment of any residual impacts and implementation of mitigation measures as necessary.
   - Stakeholder engagement to ensure ongoing communication and address any long-term concerns.

The ESIA will adhere to national and international standards and guidelines, including those of the African Development Bank and the Government of Kenya, to ensure the sustainable development and operation of the Loiyangalani Water and Sanitation Project.

The scope of the project includes the implementation of major components focused on improving water and sanitation services in Loiyangalani Town.

Water Component:

- Abstraction and raw water transmission and pumping facilities near the Ngobeleng Spring site, including seven boreholes and solar pumps.
- Water treatment facilities for disinfection, using calcium hypochlorite and automatic chlorine doses for safe consumption.
- Gravity Transmission Main Pipeline, approximately 3km long, consisting of OD315 HDPE pipes, valves, and fittings.
- Storage Tanks, including one 500 m3 ground water tank and three 100m3 elevated tanks.
- Distribution Network, with approximately 30 km total length of various diameter HDPE and steel pipes, valves, and fittings.
- Komote village reverse osmosis water treatment units, comprising two units with a capacity to treat 10m3/day.

Sanitation Component:

- On-site sanitation facilities for Loiyangalani Town, including a faecal sludge treatment plant for phase 1 (2025-2035).
- Faecal Sludge Treatment Plant with sludge drying bed, vertical flow constructed wetland, solid waste incinerator, operator store, and auxiliary works.
- Ablution blocks for primary and secondary schools, commercial places, bus stage, Kiwanja Ndege, stadium, health center, cultural center, market, commercial areas, Catholic dispensary, and police station.
- Phase 2 (2035 – 2045) will consider a review based on population density and socio-economic characteristics to determine the appropriateness of a centralized water-borne sewerage system for the Town.

The project aims to significantly improve water and sanitation infrastructure in Loiyangalani Town, ensuring access to safe drinking water and proper sanitation facilities for the community.

1.7 ESIA Justification

The ESIA for the Loiyangalani Water and Sanitation Project is crucial for several reasons:

1. Legal and Regulatory Compliance: The ESIA is a legal requirement under Kenyan law, specifically the Environmental Management and Coordination Act (EMCA) 1999, which mandates the assessment of potential environmental and social impacts of development projects.
2. African Development Bank (AfDB) Requirements: As the project is financed by the AfDB, compliance with the bank's environmental and social safeguard policies, including the requirement for an ESIA, is mandatory.
3. Identifying and Mitigating Impacts: The ESIA will identify potential environmental and social impacts of the project and propose mitigation measures to minimize or eliminate these impacts. This is essential to ensure that the project is implemented sustainably.

4. Stakeholder Engagement: The ESIA process involves consultation with affected communities and stakeholders, providing them with an opportunity to voice their concerns and participate in decision-making. This promotes transparency and accountability in project implementation.
5. Enhancing Project Design: The findings of the ESIA will inform the design and implementation of the project, ensuring that it is environmentally sound and socially responsible. This can lead to improved project outcomes and long-term sustainability.
6. Risk Management: By identifying potential risks and impacts early in the project lifecycle, the ESIA helps to manage and mitigate these risks, reducing the likelihood of costly delays or negative consequences during project implementation.

In summary, the ESIA for the Loiyangalani Water and Sanitation Project is essential to comply with legal requirements, meet international standards, engage stakeholders, and ensure the project's environmental and social sustainability.

1.8 ESIA Methodology and Approach

Chapter 3 of the ESIA report outlines the approach and methodology used in the assessment of environmental and social impacts related to the Loiyangalani Water and Sanitation Project. The methodology involved a thorough literature review of technical reports and baseline data, as well as field assessments focusing on various environmental and social risks.

Data collection and site surveys were conducted to assess the impacts of the project on the physical, biological, and socio-economic environment. This included assessments of flora and fauna, interviews with key informants, and consultations with relevant stakeholders. Secondary data was also collected from sources such as the County Integrated Development Plan and the Kenya National Bureau of Statistics Reports.

The impact identification and analysis were done using the Leopold matrix, a qualitative environmental impact assessment method. The matrix helped identify the potential impacts of the project on the environment based on factors such as the extent, timing, intensity, and probability of the impact. Impact severity was determined based on the receptor's capacity to sustain shocks triggered by the impact.

The ESIA also includes a description of the measures envisaged to prevent, reduce, and offset any significant adverse impacts on the environment. These measures are aimed at minimizing the project's impact on the environment and local communities and are integrated into the project design to ensure their effective implementation.

1.9 ESIA Chapter outline General

This ESIA report provides a comprehensive assessment of the environmental and social impacts associated with the Loiyangalani Water and Sanitation Project. The report is structured into several chapters, each focusing on different aspects of the project and its potential impacts.

The Executive Summary provides an overview of the project, including project information and the scope of work. It summarizes the key findings and recommendations of the ESIA.

Chapter 1 presents background information on the project, including its components, location, and size. It also describes the existing water supply and sanitation systems in Loiyangalani Town.

Chapter 2 outlines the approach and methodology used in the ESIA, including literature review, data collection, and site surveys. It also explains the process of environmental and social impact ranking.

Chapter 3 details the project description, including proposed water supply and sanitation solutions as outlined in the feasibility report. It covers onsite sanitation facilities, fecal sludge treatment plants, and other components presented in the feasibility study.

Chapter 4 discusses the legal and policy provisions relevant to the project, including the policy framework, legal framework, permits, licenses, and African Development policy provisions.

Chapter 5 provides baseline information on the study area, including biophysical and socio-economic baseline information. It covers rainfall, temperature, topography, geology, soils, vegetation cover, ambient air quality, noise, population, land ownership, settlements patterns, health facilities, road infrastructure, education facilities, water supply, fishing industry, hotel industry, tourism, and livestock keeping.

Chapter 6 focusses on project alternatives

Chapter 7 focuses on stakeholder engagement, including stakeholder mapping, identification, and the objectives of stakeholder engagement. It describes the consultation process at the scoping stage and public meetings at the ESIA stage.

Chapter 8 determines the environmental and social impacts of the project, including risks significance and social risks screening findings.

Chapter 9 presents the environmental and social risks management plan, including its purpose and objectives, ESMP at the construction stage, statutory requirements pre-commissioning of the WTP, ESMP during the operation of the WTP, and ESMP during the operation of the faecal sludge treatment facility.

Chapter 10 focusses on the monitoring and training plan

Chapter 11 provides recommendations based on the findings of the ESIA, outlining actions to mitigate environmental and social impacts and ensure the sustainable operation of the project.

Overall, this ESIA report provides a thorough analysis of the environmental and social impacts of the Loiyangalani Water and Sanitation Project, along with recommendations for their management and mitigation.

CHAPTER 2: Approach and Methodology

2.1 Literature Review and field Assessment

Literature review of technical reports and baseline data. A physical evaluation of the Project area was carried out with specific focus on the Environmental and Social risks related the Project as indicated below.

(i) Physical environment - including climate, air quality, water resources and water quality, noise, topography, soils, geology, hydrology including risks of natural disasters.
(ii) Biological conditions - biodiversity, ecology and nature conservation in which issues of endangered species, protected ecosystems, habitat, species of commercial importance, invasive species and their impacts were assessed.
(iii) Social-economic conditions and human health – including archaeology and cultural heritage landscape and facial aspects, recreational, social-economic aspects, land use, transportation, infrastructure, agricultural development, tourism, and human health.

Detailed methodology on data collection and field surveys for the above stated Environmental and Social variables is presented in the following sub-sections.

2.2 Data collection and Site Surveys

The objective of this activity was to carry out on-site field assessments of the expected impacts of the planned developments on the physical, biological and socio-economic environment at a preliminary level.

Assessment of flora and fauna survey was done under this phase with focus on the proposed Project component sites within Loiyangalani Town and El- Molo Village. These were assessed by means of visits, interviews and secondary data collection. Secondary data was collected using appropriate maps and relevant literature. Other useful information collected included GPS locations, digital still camera records and data sheets.

2.3 Secondary and Primary Data

Secondary socio-economic data was obtained from books, reports, journals and other sources such as the County Integrated Development Plan (CIDP) for Marsabit County Government, Kenya National Bureau of Statistics Reports. Primary data was collected from key informants and consultations which mainly included questionnaires administered to the key informants in different villages.

2.4 Environment AND SOCIAL IMPACTS RANKING

2.4.1 Impact Identification

The environment and social impact identification and analysis at ESIA stage was done using the Leopold matrix, a qualitative environmental impact assessment method pioneered in 1971 and used to identify the potential impact of a project on the environment. The matrix is a grid that is used to identify the interaction between project activities, which are displayed along one axis, and environmental characteristics, which are displayed along the other axis.

(i) Impact Rating Variables

The impact rating evaluation to be adopted summarized the key areas related to the extent of the impact,

timing of occurrence of the impact, intensity of the impact and probability of the impact as explained in **Table 3.1** below **.**

Table 2.1: Impact Rating Variables

Impact Rating	Explanation
Extent	An area of influence covered by the impact, if the action produces a much-localized effect within the space, it is considered that the impact is **low (1).** If, however, the effect does not support a precise location within the project environment, having a pervasive influence beyond the project footprint, the impact will be at location **level (3)** or could be **Beyond County (5)**
Timing:	Refers to the moment of occurrence, the time lag between the onset of action and effect on the appearance of the corresponding factor, classified in five categories from a weight of (1) implying short term to a weight of (5) implying permanent.
Intensity	Refers to the degree of impact on the factor, in the specific area in which it operates, ranked from low (1) to high (5).
Probability	Refers to the likelihood of the impact occurring during the project implementation, this is also ranked as probable to highly probable.

(ii) Impact Severity

Impact severity was determined at ESIA stage based on the capacity of the receptor to sustain shocks triggered by the impact. In this regard the impact severity could be termed as negligible, low, medium or high as summarized in **Table 3.2** below.

Table 2.2: Impact Severity

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

For effective impact identification, the environment characteristics are assigned weights based on the severity of environment impacts (Leopold, 1971) as detailed in **Table 3.3** below.

Table 3.3: Impact Rating Criteria for Environment and Social Risks

Extent		**Duration**		**Intensity**		**Probability**		**Weighting Factor (WF)**		**Severity Rating (SR)**		**Mitigation efficiency**	
Foot print	1	Short term	1	Low	1	Probable	1	Low	1	Low	0-19	High	0,2
Site (1km radius)	2	Short to medium	2			Possible	2	Low to Medium	2	Low to Medium	20-39	Medium to High	0,4
Location	3	Medium term	3	Medium	3	Likely	3	medium	3	medium	40-59	medium	0,6
Sub County	4	Long term	4			Highly likely	4	Medium to high	4	Medium to high	60-79	Low to medium	0,8
Beyond County	5	Permanent	5	High	5	High	5	High	5	High	80-100	low	1,0

(iii) Approach to Impact Mitigation and Management

The ESIA Assessment includes a description of the measures envisaged to prevent, reduce and where possible offset any significant adverse impacts on the environment. The identification of such measures is an interactive process which needs to be undertaken in parallel with the design to aid the incorporation of measures into the design during Project development. Early adoption of appropriate mitigation will help reduce significant environmental impacts to a practicable minimum.

CHAPTER 3: PROJECT DESCRIPTION

3.1 Background Information

Northern Water Works Development Agency (NWWDA) in partnership with the Tana Water Works Development Agency, has engaged Kiri Consult Limited (referred to as Kiri or the Consultant) to conduct the "Detailed Design of the Loiyangalani Town Water Supply and Sanitation Project." This project aims to enhance water supply and sanitation services in Loiyangalani Town, which falls under the classification of arid and semi-arid areas.

3.2 Project Components Description

The major components of the project are:

a) Water Component

Table 4:Summary of analyzed water supply options

Water Component	Details
Abstraction and raw water transmission and pumping facilities in the vicinity of Ngobeleng Spring site	i. Seven (7) boreholes in the vicinity of Ngobeleng spring site ii. Solar pumps
Water treatment facilities	Disinfection: of the water by dosing of calcium hypochlorite followed by adequate contact time to ensure that it is safe for consumption. Automatic Chlorine Dosers for accurate in-line injection of chlorine, installed directly on the raw water supply line with a hydraulic motor pump that will use the water flow as its energy source
Gravity Transmission Main Pipeline, Approx. 3km long:	Supply and installation of OD315 HDPE pipes, valves and fittings, including associated concrete and masonry works in pipeline supports, valve chambers, washout drains, etc.
Storage Tanks	iii) One no. 500 m^3 ground water tank iv) Three 100m^3 elevated tank.
Distribution Network	Approximately 30 km total length of various diameter of HDPE and steel pipes, valves and fittings, including associated concrete and masonry works in pipeline supports, valve chambers, washout drains, etc. as shown in the bill of Quantities and drawings
Komote village reverse osmosis water treatment units	Two reverse Osmosis Units were considered to meet phase 1 demand with a capacity to treat 10m^3/day consisting of the following: • Pre-treatment sand and activated carbon • Ion Exchange Resin • Catridge Filter • Ultraviolet Disinfecting Unit

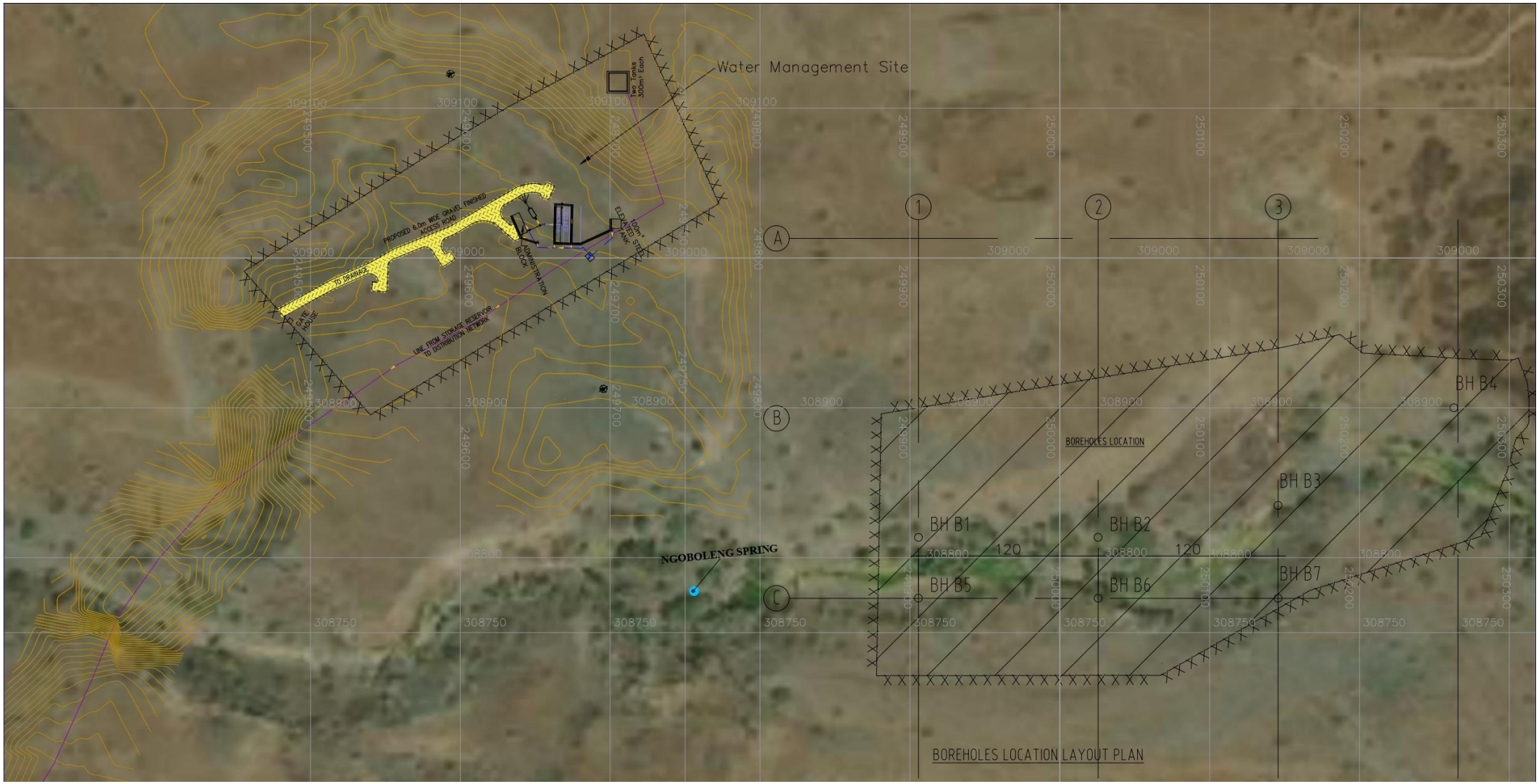


Figure 1: Boreholes and water management site layout. All boreholes in one area

b) Sanitation Component

iii. On-site sanitation facilities have been proposed for Loiyangalani Town, together with faecal sludge treatment plant, for phase 1 (2025-2035). The feasibility report provides the construction of 2no sludge drying beds each 1391m^2 in Loyaingalani town and a wetland (23.75m long by 12.5m wide as indicated below

A. Faecal Sludge Treatment Plant
    a. Sludge Drying Bed
    b. Vertical Flow Constructed Wetland
    c. Solid Waste Incinerator
    d. Operator Store
    e. Site and Auxiliary Works
    f. Guard House
B. Primary Schools - Seven (7) Ablution Blocks - Each With 13 Doors
C. Loiyangalani Secondary School Ablution Blocks -Two Blocks Each With 2 Doors
D. Commercial Places - A. Kula mawe – 11 doors latrines- 1 block
E. Bus stage - 11 doors latrines – 1 block
F. CKiwanja Ndege - 11 doors latrines - 1 block
G. Stadium
H. Health Centre
I. Cultural Centre
J. Market
K. Commercial Areas (2 no of places)
L. Catholic Dispensary
M. Police Station

iv. It is proposed that for Phase 2 (2035 – 2045), a review be done on the population density and socio-economic characteristics in Loiyangalani town to establish if a centralized water-borne sewerage will be appropriate for the Town at that stage.

Other Project components

The feasibility report presents other Project Components as summarized below:

Table 5:Summary of analyzed water supply options

No	**Interventions**	**Output**
1	Introduce gulper and Vaccutugs to service the entire Loiyangalani town	4 number of Gulper/ vacuutug operators identified from among local residents
		Procure 3 Gulpers
		Procure 1 Vaccutug
2	Define Standard Operating Procedures (SOPs) for pit emptying services	
3	Conduct trainings for pit emptiers and award certificates	
4.3	A licensing framework for Faecal Sludge Management (FSM) developed and implemented	Develop licenses specific to FS handling and treatment

3.3 Land Requirement for Easement for the Water Pipelines

The water pipelines will mostly follow road reserves and wayleaves, minimizing impact on Project Affected Persons (PAPs). However, a 4km pipeline section will traverse communal grazing land.

3.4 Resources required during implementation

For a water supply and sanitation project involving construction of pipelines, reinforced concrete tanks, boreholes, solar pumps, houses, and a faecal sludge treatment plant, the following resources, equipment, machinery, and raw materials will be required during various project phases:

1) **Resources:**

- Skilled and unskilled labor for construction and operation.
- Project management and supervision staff.
- Administrative staff for documentation and reporting.
- Financial resources for procurement of materials and equipment.

2) **Equipment and Machinery:**

- Excavators, bulldozers, and graders for earthmoving and site preparation.
- Trucks and trailers for transportation of materials.
- Concrete mixers and batching plants for concrete works.
- Drilling rigs and equipment for borehole construction.
- Solar pumps and related equipment for water pumping.
- Construction vehicles for personnel transportation and material handling.

3) **Raw Materials:**

- Cement, aggregates, and reinforcement bars for concrete works.
- Pipes, valves, and fittings for pipeline construction.
- Steel sheets and bars for tank construction.
- Electrical components for solar pump installation.
- Building materials for house construction.
- Chemicals and materials for faecal sludge treatment plant construction.

4) **Utilities:**

- Water for construction purposes.
- Electricity for machinery and equipment operation.

5) **Safety and Protective Gear:**

- Personal protective equipment (PPE) for workers.
- Safety signage and barriers for construction sites.
- Fire extinguishers and first aid kits.

6) **Transportation:**

- Vehicles for transportation of personnel and materials to and from the construction site.

7) **Miscellaneous:**

- Surveying and measurement tools for site layout and construction.
- Office equipment for project management and administration.

8) **Consultancy and Services:**

- Engineering and architectural consultancy services.
- Testing and quality assurance services for materials and construction works.

Overall, the successful implementation of the water supply and sanitation project will depend on the availability and efficient utilization of these resources, equipment, machinery, and raw materials throughout the project phases.

3.5 Activities for various phases

During the implementation of a water supply and sanitation project, several activities will be undertaken across different phases to ensure the successful completion of the project. The activities can be broadly categorized into the following phases:

1) **Construction Phase:**

- Site clearing and preparation.
- Excavation and earthworks for pipeline trenches, tank foundations, and borehole sites.
- Construction of pipelines, including laying, jointing, and testing.
- Installation of reinforced concrete tanks and other storage facilities.
- Drilling and installation of boreholes and installation of solar pumps.
- Construction of houses for project staff and workers.
- Installation of faecal sludge treatment plant components.
- Implementation of environmental and social mitigation measures.
- Quality control and assurance of construction works.
- Health and safety management on the construction site.
- Monitoring and reporting progress to project management.

2) **Post-construction Phase:**

- Testing and commissioning of water supply and sanitation facilities.
- Training of local communities on the operation and maintenance of facilities.
- Handover of the project to the local authorities or operators.
- Monitoring and evaluation of the project's performance.
- Implementation of operation and maintenance plans.
- Addressing any defects or issues identified during the post-construction phase.

Throughout these phases, effective project management, stakeholder engagement, and monitoring are essential to ensure that the project is delivered on time, within budget, and meets the required quality standards.

CHAPTER 4: LEGAL AND POLICY PROVISION

4.1 0verview

This Chapter reviews the pertinent institutional, policy and legal framework governing environmental and socio-economic issues that must be taken into consideration during the Project implementation.

The Constitution of Kenya is the supreme law of the republic and binds all persons and all state organs at all levels of government. The Constitution of Kenya, 2010 provides a broad frame work regulating all existence and development aspects of interest to the people of Kenya, and along which all national and sectorial legislative documents are drawn. In relation to the environment, article 42 of chapter four, of the Bill of Rights, confers to every person the right to a clean and health environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative measures, particularly those contemplated in article 69, and to have obligations relating to the environment fulfilled under Article 70. Kenya is a signatory to various international agreements, conventions, and treaties that have environmental implications/provisions and as such cannot be contravened during project development phases. In the past, the government had established several National policies and Legal Statutes to enhance environmental conservation and sustainable development. Some of the policy and legal provisions are briefly presented in the following sub- sections. Before the enactment of EMCA in 1999; Environmental conservation aspects and pollution control were scattered in the various sectoral pieces of legislation thus making coordination very difficult. However, since it is not possible to capture everything, it is recommended that the proponent acquire copies of the Acts, Regulations and Policy documents for completeness.

4.2 Environmental Management Principles and Guidelines

The project proponent is expected under law and set practice to consider and exercise the principles and guidelines of environmental management as follows:

4.2.1 Sustainability

In the course of implementing the proposed project, the project proponent is expected to use resources sustainably and source materials from suppliers that have been identified as practicing sustainable resources use, thereby maintaining the potential of the natural resources to meet the needs and aspirations of present and future generations.

4.2.2 Intergenerational Equity

Operations and activities undertaken at all the stages of the proposed project ought to be designed o comply with the principle of intergeneration equity in resources use of both natural and man- made resources. Additionally, various resource users in the current generation should not have their resource use ability compromised by the proposed project

4.2.3 Prevention

The project proponent should undertake all the preventive and viable measures to protect the environment in the first place, throughout all the phases of the project (Construction, Operation and Decommissioning) rather than allow damage to take place then take remedial action. Prevention is far less costly than mitigating environmental damage.

4.2.4 Precaution

The project proponent should undertake all the necessary precaution in the making of environmental decisions where there is scientific uncertainty and such uncertainty should not be used as a reason for not taking cost effective measures to prevent environmental harm.

4.2.5 Polluter Pays Principle

Polluters of natural resources are required to bear the full environmental and social costs of their activities. Therefore, should the project proponent cause damage to private properties or public utilities such as roads or public goods such as water bodies, measures to compensate the affected should be instituted immediately.

4.2.6 Public Participation

The project proponent will ensure environmental democracy and involvement of the public, especially local communities in environmental and developmental decisions that it seeks to make, which affect their lives. The public participation process shall be open and transparent, provide valuable information on key impacts, potential mitigation measures and possible alternatives as well as enlighten the community on the opportunities and benefits that could arise from a project.

4.2.7 Cultural & Social Principal

Due consideration shall be made of the local environment management systems in the course of implementing the project and due care shall thus be exercised while introducing technologies that may conflict with the existing environmental management systems.

4.3 Relevance and Application of Multilateral Environmental Agreements (MEAs) in the Loiyangalani Water and Sanitation Project:

1. United Nations Framework Convention on Climate Change (UNFCCC):

- **Relevance:** The UNFCCC aims to stabilize greenhouse gas concentrations in the atmosphere and address climate change impacts, including water scarcity and extreme weather events.
- **Application:** Climate resilience measures have been integrated into project design. For instance, climate risk assessments have been conducted to identify vulnerabilities, and the project incorporates climate-resilient technologies such as drought-resistant water infrastructure to mitigate the impacts of climate change.

2. Stockholm Convention on Persistent Organic Pollutants (POPs):

- **Relevance:** Addresses the global distribution and effects of persistent organic pollutants, including those present in water and sanitation systems.
- **Application:** To minimize chemical usage, the project proposes solutions that require minimal use of chemicals in water treatment processes. This includes exploring alternative treatment methods and technologies that reduce reliance on hazardous chemicals, aligning with the objectives of the Stockholm Convention to mitigate environmental contamination.

3. Convention on Biological Diversity (CBD):

- **Relevance:** Promotes the conservation and sustainable use of biodiversity, including aquatic ecosystems and freshwater resources.
- **Application:** Measures to protect biodiversity have been implemented. For instance, biodiversity assessments were conducted to identify sensitive areas, and buffer zones were established around water sources to minimize habitat disturbance and preserve ecological integrity, reducing the need for extensive chemical treatment methods.

4. Rotterdam Convention on Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade:

- **Relevance:** Regulates the international trade of hazardous chemicals, ensuring informed decision-making and risk reduction.
- **Application:** Rigorous chemical risk assessments have been conducted to identify alternatives and minimize the use of hazardous chemicals. The project prioritizes solutions that require minimal use of chemicals in water treatment processes, adhering to the principles of the Rotterdam Convention to reduce environmental and health risks associated with chemical exposure.

5. Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention):

- **Relevance:** Promotes transparency, public participation, and access to justice in environmental decision-making processes.
- **Application:** Stakeholder engagement activities have been prioritized to explore alternative treatment methods and technologies that reduce reliance on hazardous chemicals. Extensive consultations with local communities and stakeholders ensure their involvement in decision-making processes and support the adoption of environmentally friendly solutions, in line with the principles of the Aarhus Convention.

By applying the principles and requirements of these relevant MEAs, the Loiyangalani Water and Sanitation Project demonstrates a commitment to environmental sustainability, biodiversity conservation, climate resilience, and stakeholder engagement, ensuring the project's success in promoting sustainable development and improving the well-being of local communities.

African Development Bank Environmental and Social Guideline and Policies

The African Development Bank Group (AfDB). As a multilateral development bank, AfDB has joined the other international financing institutions in adopting environmental and social policies, guidelines, and procedures to ensure that its operations avoid adverse impacts on people and the environment.

4.3.1 OPERATIONAL SAFEGUARDS

The Bank selected the Operational Safeguards (Oss) for inclusion in the ISS based on the following considerations:

- Commitments in the Bank's existing policies
- Relevance to key environmental and social issues in the region
- Lessons learned from applying the environmental and social policies/procedures in the Bank
- Harmonization with other multilateral development banks and alignment with relevant international conventions and standards
- Outcomes of stakeholder consultations; an
- Limiting the number of OSs to just what is required to achieve the optimal functioning of the ISS. The OSs are intended to:
- Better integrate considerations of environmental and social impacts into the Bank operations to promote sustainability and long term development in Africa;
- Prevent projects from adversely affecting the environment and local communities or, where prevention is not possible, minimize, mitigate and/or compensate for adverse effects and maximize development benefits;
- Systematically consider the impact of climate change on the sustainability of investment projects and the contribution of projects to global greenhouse gas emissions;
- Delineate the roles and responsibilities of the Bank and its borrowers or clients in implementing projects, achieving sustainable outcomes, and promoting local participation; an

- Assist regional member countries and borrowers/ clients in strengthening their own safeguards systems and their capacity to manage environmental and social risks.
- Relevant Operational Standards (Oss) of the African Development Bank Group that are triggered by the Project are summarized below;

OS1: ENVIRONMENTAL AND SOCIAL ASSESSMENT

This overarching safeguard governs the process of determining a project's environmental and social category and the resulting environmental and social assessment requirements: the scope of application; categorization; use of a SESA and ESIA, where appropriate; Environmental and Social Management Plans; climate change vulnerability assessment; public consultation; community impacts; appraisal and treatment of vulnerable groups; and grievance procedures. It updates and consolidates the policy commitments set out in the Bank's policy on the environment.

OS 2: INVOLUNTARY RESETTLEMENT

Land Acquisition, Population Displacement and Compensation – This safeguard consolidates the policy commitments and requirements set out in the Bank's policy on involuntary resettlement, and it incorporates refinements designed to improve the operational effectiveness of those requirements. In particular, it embraces comprehensive and forward looking notions of livelihood and assets, accounting for their social, cultural, and economic dimensions. It also adopts a definition of community and common property that emphasizes the need to maintain social cohesion, community structures, and the social interlinkages that common property provides. The safeguard retains the requirement to provide compensation at full replacement cost; reiterates the importance of a resettlement that improves standards of living, income-earning capacity, and overall means of livelihood; and emphasizes the need to ensure that social considerations, such as gender, age, and stakes in the project outcome, do not disenfranchise particular project-affected people.

OS 3: BIODIVERSITY AND ECOSYSTEM SERVICES

The overarching objective of this safeguard is to conserve biological diversity and promote the sustainable use of natural resources. It translates into OS requirements the Bank's commitments in its policy on integrated water resources management and the UN Convention on Biological Diversity. The safeguard reflects the importance of biodiversity on the African continent and the value of key ecosystems to the population, emphasizing the need to "respect, conserve and maintain [the] knowledge, innovations and practices of indigenous and local communities… [and] to protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements3 .

OS 4: POLLUTION PREVENTION AND CONTROL, GREENHOUSE GASES, HAZARDOUS MATERIALS AND RESOURCE EFFICIENCY

This safeguard covers the range of impacts of pollution, waste, and hazardous materials for which there are agreed international conventions and comprehensive industry-specific standards that other multilateral development banks follow. It also introduces vulnerability analysis and monitoring of greenhouse gases.

OS 5: LABOR CONDITIONS, HEALTH AND SAFETY

This safeguard establishes the Bank's requirements for its borrowers or clients concerning workers' conditions, rights and protection from abuse or exploitation. It covers working conditions, workers' organizations, occupational health and safety, and avoidance of child or forced labor

4.3.2 Applicable African Development Bank Operational Safeguard Polices applicable to this project

The Project is being financed by AfDB. It was therefore checked against the listed Operation Safeguards (OS) in **the following table** and appropriate mitigation measures likely to be triggered under each

Policy are also provided.

Table 4-1: Project Activities Triggering AfDB Operational Safeguards

Policy	Discussions
OS 1: Environmental and Social Assessment.	The Project components will trigger OS 1, the assessment identified that According to OS 1 screening provisions, Loiyangalani Water and Sewerage Project is a **Category 2.** The project is likely to have detrimental site-specific environmental and/or social impacts but can be reversible, and minimized by applying appropriate management and mitigation measures. Mitigation measures for impacts identified are detailed in chapter 9 of this report. Impact identified to be triggered during operation is likely pollution due to spillage during desludging which should be mitigated by ensuring only licensed emptiers desludge and refusal to renew contract for operators who don't adhere to operation procedures which will include health and safety measures . The following is the approach to reduce negative impacts from sanitation facilities to be implemented by the County Government of Marsabit: • Define Standard Operating Procedures (SOPs) for pit emptying services • Conduct trainings for pit emptiers and award certificates • A licensing framework for Faecal Sludge Management (FSM) developed and implemented. • Amend, develop and gazette by-laws/standards to accommodate standardized lined pit latrines, septic tanks and faecal sludge management • Improve compliance monitoring of by-law and standards for FSM and onsite sanitation facilities construction (Ensure only approved lined pit latrines and septic tanks designs are constructed in Loiyangalani Town) - Hire staff dedicated to compliance monitoring for Loiyangalani Town • Branding and safe/improved sanitation awareness campaigns. Develop, initiate and sustain updated branding and local awareness messaging campaign on safely managed sanitation and information on by-laws & standards
OS 2: Involuntary Resettlement: Land Acquisition, Population Displacement and Compensation.	The policy aims to avoid involuntary resettlement where feasible, or minimize resettlement impacts where involuntary resettlement is deemed unavoidable after all alternative Project designs have been explored. For Loiyangalani Water and Sanitation Project, displacement of population is not triggered as pipelines are designed to follow River Riparian and Roads Reserves. In cases where this is not the case, the land was voluntarily donated by the community as is the case for Boreholes area, water management site and faecal sludge treatment plant- However, the Project will impact crops/trees / structures/fences.

OS 3: Biodiversity, Renewable Resources and Ecosystem Services.	The safeguard aims to conserve biological diversity and ecosystem integrity by avoiding or, if avoidance is not possible, reducing and mitigating any adverse environment and social risks. , For Proposed Loiyangalani Water and Sanitation Project, the focus will be on the establishment and enforcement of operation standards that will meet NEMA requirements to ensure no spillage during operations. The treatment method proposed "Faecal Sludge Treatment Plant" will ensure the effluent is treated to the required BOD levels; the measure will be adhered to so that the quality of water is guaranteed for the town dwellers and aquatic ecosystem.
OS 4: Pollution Prevention and Control, Greenhouse Gases, Hazardous Materials and Resource Efficiency.	The Project shall utilize raw materials both during construction and operation phase that could result to pollution of biophysical environment if not handled appropriately. Appropriate mitigation measures for likely waste to be generated by the Project are detailed in chapter 9 of this report. Project activities shall not result to significant amount of greenhouse gases, **Sub Chapter 8.4** provides measures for management of all negative impacts from this project.
OS 5: Labour Conditions, Health and Safety.	The Project shall involve workers both during construction and operation phases of the project. This policy read together with OSHA 2007 shall form integral instruments to be used in ensuring that health, safety and working conditions of both works and community is safeguards. The Labour Relations Act 201 will be applied by labour force on site in addressing disputes related to working conditions.

4.4 Policy Framework

The water sector in Kenya is guided by the Kenya Vision 2030, Water Act 2016, the Water Policy 1999 and the water strategic plan 2013-2017, among other instruments. **Table 4.1 below** presents a summary relevant policy provisions and legal statutes that were analyzed at **ESIA stage** of the Project.

Table 4.1: Policy Framework Relevant to Water and Sanitation Infrastructure

No	Policy	Applicability
1	Constitution of Kenya (CoK) 2010	Article 43 (1) provides that every person has the right – (b) to accessible and adequate housing, to reasonable standards or sanitation; and, (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 Projects, both public and private investments. It also calls for the duty given to the Project proponent

No	Policy	Applicability
		to co-operate with State organs and other persons to protect and conserve the environment as mentioned in Part II.
2	National Environment Policy (NEP):	The revised draft of the National Environmental Policy, dated April 2012, sets out important provisions relating to the management of ecosystems and the sustainable use of natural resources. The Project area is ecological zone V and VI. Ecosystems under these zones are sensitive to any activity out of character with the ecosystem. Therefore, during implementation of the Project Components proper environment assessment will be undertaken in order to ensure that the ecosystems are not destabilized.
3	The National Environmental Sanitation and Hygiene Policy-July 2007:	The Policy is devoted to environmental sanitation and hygiene in Kenya as a major contribution to the dignity, health, welfare, social well-being and prosperity of all Kenyan residents. The Policy recognizes that healthy and hygienic behavior and practices begin with the individual. The implementation of the Policy will greatly increase the demand for sanitation, hygiene, food safety, improved housing, use of safe drinking water, waste management, vector control at the household level and encourage communities to take responsibility for improving the sanitary conditions of their immediate environment.
4	National Policy on Water Resources Management and Development (Sessional Paper No.1 of 1999)	The management of water resources in Kenya is guided by four specific policy objectives, namely: • Preserve, conserve, and protect available water resources and allocate it in a sustainable rational and economic way; • Supply water of good quality in sufficient quantities to meet the various water needs, including poverty alleviation, while ensuring the safe disposal of wastewater and environmental protection; • Establish an efficient and effective institutional framework to achieve a systematic development and management of the water sector; and • Develop a sound and sustainable financing system for effective water resources management, water supply and sanitation development. It enhances a systematic development of water facilities in all sectors for the promotion of the country's socio-economic progress and recognizes the by-products of these processes as wastewater. It calls for development of appropriate sanitation systems to protect people's health and water resources from pollution.
5	The National Water Policy 2012 (Draft)	The Policy is built on the achievements of the sector reform commenced with the Water Act and based on the sector principles lined out in the National Water Policy 1999.

No	Policy	Applicability
		On water resources management, the policy seeks the management of water resources along natural catchment/basin boundaries following the Integrated Water Resource Management approach. It aims to ensure a comprehensive framework for promoting optimal, sustainable, and equitable development and use of water resources for livelihoods of Kenyans through: • Progressive restoration and protection of ecological systems and biodiversity in strategic water catchments; • increasing per capita water availability above the international benchmark of 1000 m. by 2030; • Maximizing use of trans-boundary water resources in coordination with other riparian countries; • Enhancing storm water management and rainwater harvesting; • Enhancing inter-basin water transfer in Kenya as a strategic intervention for optimized used of water resources; • Improving effluent waters treatment and recycling for use; • Ensuring sustainable groundwater resources for present and future generations; and • Developing a water management system which contributes to the protection of the environment.
6	Kenya Vision 2030	The Kenya Vision 2030 is the new county's development blueprint covering the period 2008 to 2030. It aims at making Kenya a newly leading industrializing middle income country providing high quality life for all its citizens by the year 2030. The vision has been developed through an all- inclusive stakeholder consultative process, involving Kenyans from all parts of the country. The vision is based on three 'pillars' – Economic, Social and Political. The environmental sector falls under the social pillar. The vision came after the successful implementation of the Economic Recovery Strategy for Wealth Creation which saw the country's economy back on the path to rapid growth since 2002 when the GDP was at 0.6% rising to 1% in 2006. The long-term success of achieving Vision 2030 targets will largely be dependent on ensuring that environmental management is addressed in medium term plans as an enabler for sustained pro-development rather than as an inhibitor to development. It is therefore critical that all constructions within the country take care of the environment and ensure environmental sustainability in order to help achieve this very important Millenium Development Goal amongst others. The vision is recognized that Kenya is a water scarce Country but stated (Kenya, 2007: 115) that the Vision for the water and sanitation sector is "to ensure water and improved sanitation services availability. The Project will directly contribute towards achievement of objectives of vision under the environment and social pillar through provision of the planned dam projects.

No	Policy	Applicability
7	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: 53).
8	The National Land Policy (Sessional Paper No. 3 of 2009)	The policy regulates rights over land and provides for sustainable growth, investment and the reduction of poverty in line with the Government s overall development objectives. Specifically, "the policy offers a framework of policies and laws designed to ensure the maintenance of a system of land administration and management. The overall objective of the National Land Policy is to secure land rights and provide for sustainable growth, investment, and the reduction of poverty in line with the governments overall development objectives.
9	Economic Recovery for Wealth and Employment Creation Strategy 2006	The overall goal of the strategy is to ensure clear improvement in the social and economic wellbeing of all Kenyans; thereby giving Kenyans a better deal in their lives, and in their struggle to build a modern and prosperous nation. The key areas covered in the strategy are: • Expanding and improving infrastructure; • Reforms in trade and industry; • Reforms in forestry; • Affordable shelter and housing; • Developing arid and semi-arid lands, and • Safeguarding environment and natural resources.
	National Environmental Action Plan (NEAP	According to NEAP 1994, the government recognized the negative impacts on ecosystems emanating from development programmes that disregarded environmental sustainability. Established in 1990, the plan's effort was to integrate environmental considerations into the Country's Economic and Social Development. The integration process was to be achieved through a multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and the conservation of natural resources are an integral part of societal decision-making. Under the NEAP process EIA was introdu
	National Water Resources Management Strategy (NWRMS)-2012- 2017	The formulation of the NWRMS 2012-2017 was guided by the emergence of new developmentsin the water resources sub-sector through policy development brought about by the Constitution of Kenya 2010, the vision 2030, the Water Bill 2014, the ational Rain Water Harvesting andStorage policy, the guidelines on the use of trans boundary water resources and the NationalWater Master Plan (NWMP) 2030.

No	Policy	Applicability
		The strategy was founded on major thematic areas in water resources management. These included data acquisition and management, water resource planning and allocation, adequate quantity and quality water resources, catchment protection and management, human resource development and management and financial resources mobilization and accountability. Based on these thematic areas, strategic objectives were formulated and are identified as follows; • Strengthening monitoring networks to enhance data collection and improve information management system; • Improving the use of water resources management tools for effective water resources planning and allocation; • Strengthening stakeholder collaboration to enhance water storage and adaptation to climate change impacts; • Strengthening enforcement mechanism and collaboration for effective catchment protection and conservation; • Building staff capacity and improve work environment; • Enhancing resource mobilization and effective use of finances; • The strategy recognizes the negative impact on water resources due to environmental changes and the continued demand for water services. The Ministry of Water Sanitation and Irrigation has emphasized on storage development through which the National Water Harvesting and Storage Policy which provides a framework for water harvesting including mandatory requirement to provide buildings with rainwater harvesting systems, has been developed. The NWMP 2030 aims at progressively increasing the availability of water resources through accurate assessment, optimal management and development of existing potentials. This entails enhancing water storage through designing additional large/medium and small- scale storage facilities as envisaged in Vision 2030. It also entails promoting rainwater harvesting and storage systems, re-establishing green water storage areas such as wetlands and forests,water-savingg technologies, ground aquifer re-charging, recycling treated effluent water, and restoring and rehabilitating identified storage systems constructed since the colonial period.
	Policy Guidelines on Environment and Development	Among the key objectives of the policy paper on Environment and Development (Sessional Paper No. 6 of 1999) are to ensure that from the onset, all development policies, programs and projects take environmental considerations into account and to ensure that an EIA report is prepared for any industrial venture or any other development before implementation among others.
	Environmental Management and Co-ordination, (Waste Management) Regulations,	This regulation defines the responsibilities of waste generators and the duties and requirements for the transportation and disposal of wastes. It states that “no person shall dispose of any waste on a public highway, street, road, recreation area or in any public place except in a designated receptacle and a waste generator shall collect, segregate and dispose such waste in the manner provided for under these

No	Policy	Applicability
	2006	regulations". It provides for mitigation of pollution and provides for hazardous and toxic wastes Responsibilities of a waste generator • No person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle. • Any person whose activities generate waste shall collect, segregate and dispose or cause to be disposed of such waste in the manner provided for under these Regulations. • Without prejudice to the foregoing, any person whose activities generate waste has an obligation to ensure that such waste is transferred to a person who is licensed to transport and dispose of. Cleaner Production Principles Any person who owns or controls a facility or premises which generates waste shall minimize the waste generated by adopting the following cleaner production principles: 1.Improvement of production process through: 2. Conserving raw materials and energy 3. Eliminating the use of toxic raw materials within such time as may be prescribed by the Authority 4. Reducing toxic emissions and wastes monitoring the product cycle from beginning to end by: - • Identifying and eliminating potential negative impacts of the product. • Enabling the recovery and re-use of the product where possible. • Reclamation and recycling. • incorporating environmental concerns in the design, process and disposal of a product. 3.9.5

4.5 Legal Framework

Applicable Acts of Parliament as summarized in **Table 4.2** below reviewed at ESIA stage

Table 4.2: Legal Framework Relevant to Water and Sanitation Infrastructure

Policy	Applicability
EMCA 1999 Cap 397	The Environmental Management and Coordination Act of 1999 (EMCA) 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, parastatal, and State Corporation or local authority in which any law vests

Policy	Applicability
	functions of control or management of any element of the environment or natural resource. EMCA addresses itself primarily to Environmental Impact Assessment (Section 58). The Environmental (Impact Assessment and Audit) Regulations of 2003, however, recognizes SEAs as a measure of environmental impact assessment at strategic level such as policy, plans and programmes. Waste Management Regulations, 2006: Regulation 4 (1) states that no person shall dispose of any waste on a public highway, street, road, recreational area or in any place except in a designated receptacle". Regulation 4 (2) further states that "a waste generator shall collect, segregate and dispose such waste in the manner provided for under these regulations". The proponent will use provisions of this regulation to ensure that waste is handled, stored, transported and disposed as per this regulation.
Land Act, 2012	It is the substantive law governing land in Kenya and provides legal regime over administration of public and private lands. It also provides for the acquisition of land for public benefit. The government has the powers under this Act to acquire land for projects, which are intended to benefit the general public. This Act provides for the procedure to be followed during compulsory acquisition of land by the Government and the just compensation which should be paid promptly and in full to all persons whose interest in land has been affected. This Act will be applied during land acquisition if required.
Water Act, 2016	Article 43 of the Constitution stipulates that every person in Kenya has the right to clean and safe water in adequate quantities and to reasonable standards of sanitation. In conformity to this constitutional requirement, the Water Act, 2016 was enacted. It is "AN ACT of Parliament to provide for the regulation, management and development of water resources, water and sanitation services; and for other connected purposes". The law provides for national public water works (Article 8(2)) that include water storage, water works for bulk distribution and provision of water services, inter-basin water transfer facilities, and reservoirs for impounding surface run-off and for regulating stream flows to synchronize them with water demand patterns which are of strategic or national importance. It vests the administration of water resources to the National Government (Article 9) and calls for public participation in the formulation of a National Water Resource Strategy (Article 10 (1)) on five-year cycles. The Strategy shall provide the Government's plans and programs for the protection, conservation, control and management of water resources (2). Article 10(3) gives the details of the contents of the National Water Resource Strategy, i.e.: (a) existing water resources and their defined riparian areas; (b) measures for the protection, conservation, control and management of water resources and approved land use for the riparian area; (c) minimum water reserve levels at national and county levels; (d) institutional capacity for water research and technological development;

Policy	Applicability
	(e) functional responsibility for national and county governments in relation to water resources management; and (f) any other matters the Cabinet Secretary considers necessary. The new law aligned national water management and water services provision with the requirements of the Constitution of Kenya 2010 particularly on the clauses devolving water and sanitation services to the county governments. Service provision is devolved to the Counties who are the owners of Water Service Providers (WSPs).
County Government Act No. 17 of 2012	The preamble to the Act gives overriding object and purpose of the Act. It states that, 'An Act of Parliament to give effect to Chapter Eleven of the Constitution; to provide for county governments' powers, functions and responsibilities to deliver services and for connected purposes. Part II elaborate on the functions and powers of the county government, emphasizing its constitutional authority to enter into contracts, acquire and hold and dispose of assets, and delegate functions, such as through sub-contracts and partnerships. Part VI considers the foci and administration of decentralization to the sub-county level, including to urban areas and cities. The County Government Act, 2012, provides the basis for spatial plans as statutory requirements in the county. The Act stipulates a 10-year spatial plan be developed by each county to provide for: (a) spatial depiction of the social and economic development programme of the county as articulated in the integrated county development plan; (b) a clear statement of how the spatial plan is linked to the regional, national and other county plans; and (c) a clear clarification on the anticipated sustainable development outcomes of the spatial plan.
Physical and Land Use Development Plan Act 2019	Section 16 of the Physical Planning Act (Chapter 286) provides that the Director may prepare a regional physical development plan. The plan shall consist of inter alia, a statement of policies and proposals with regard to the allocation of resources and the locations for development within the area. The Act requires the Director to invite any person interested to make representations to do so within sixty days of the publication of the plan. On approval of the regional physical development plan no development shall take place on any land unless it is in conformity with the plan. Section 24 provides for the Director to prepare also a local physical development plan whose purpose is to guide and coordinate development and for the control of the use and development of land. The proposed sanitation works will be implemented in line with the approved Local Physical Development Plans (LPDPs) for Marsabit County. Particular interest will be site for FSTP and alignment of trunk and secondary sewers along road reserves and river riparian
The Urban Areas and Cities Act 2011	This Law passed in 2011 provides legal basis for classification of urban areas (City) when the population exceeds 500,000; a municipality when it exceeds 250,000; and a town when it exceeds 10,000) and requires the city and municipality to formulate County Integrated Development Plan (Article 36 of the Act).

Policy	Applicability
Occupational Health and Safety Act (OSHA 2007)	The Act provides Environment Health and Safety (EHS) Guidelines which shall be followed by both the Contractor and Supervising Consultant during implementation of the Project to avoid injuries and even loss of life to workers and neighboring community.
The Public Health Act (Cap.242)	This is an Act of Parliament that makes provision for securing and maintaining health. Part IX contains provision regarding sanitation and housing. Section 115 of the Act states that no person shall cause nuisance or cause to exist on any land or premises any condition liable to be injurious or dangerous to human health. Section 116 requires that Local Authorities take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to be injurious or dangerous to human health. The Act also contains provisions on discharges of pollutants into water sources. On responsibility of the Local Authorities Part XI, section 129, of the Act states in part "It shall be the duty of every local authority to take all lawful, necessary and reasonably practicable measures for preventing any pollution dangerous to health of any supply of water which the public within its district has a right to use and does use for drinking or domestic purposes. Part XII, Section 136, states that all collections of water, sewage, rubbish, refuse and other fluids which permit or facilitate the breeding or multiplication of pests shall be deemed nuisances under this Act.
Environmental Management and Coordination Act (Noise and Excessive Vibration Pollution) (Control) Regulations 2009	The Act is conferred by section 147 of EMCA 1999. Part II section (5) states that "no person shall make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule, unless it's necessary to the preservation of life, health, safety or property". Section (6) (1and 2) ensures that no person shall cause noise from any source which exceeds any sound level as set out in the regulations and measurements shall be taken by the relevant lead agency. Sub section (5) states that "any person who makes noise more than the prescribed levels commits an offence". Section 7 (a-d) exempts noise emitted during alerting, performance or noise in connection with the protection of the health and safety of residents or their property during emergency conditions and or warning devices necessary for the protection of public safety.
HIV and AIDS Prevention and Control Act 2011	The objective 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 on sexual offenses on minor (children).
Child Rights Act (Amendment Bill) 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

Policy	Applicability
	Charter on the Rights and Welfare of the Child. Contractors implementing the various Project components envisaged under the Master Plan Study 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 workforce on site.
The National Museums and Heritage Act 2006	An Act of Parliament to consolidate the law relating to national museums and heritage; to provide for the establishment, control, management and development of national museums and the identification, protection, conservation and transmission of the cultural and natural heritage of Kenya; to repeal the Antiquities and Monuments Act (Cap. 215) and the National Museums Act; and for connected purposes. This act together with world bank policy OP 4.11 on Physical Cultural Resources will be quoted in the event that the project will encounter such materials, chance find procedures will be provided to specific ESIAs that will be prepared.
The Chiefs' Authority Act CAP 128	The Act in Section 10 States that any chief may from time to time issue orders to be obeyed by the persons residing or being within the local limits of his jurisdiction for any of the following purposes; • preventing the pollution of the water in any stream, watercourse or water-hole and preventing the obstruction of any stream or watercourse • regulating the cutting of timber and prohibiting the wasteful destruction of trees • preventing the spread of diseases, whether of human being or animals • prohibiting any act or thing that may cause damage to any public road or to any work constructed or maintained for the benefit of the community

4.6 Institutional framework

4.6.1 Introduction

The Constitution of Kenya is the supreme law of the Republic and binds all persons and all state organs at all levels of government. It provides broad frame work regulating all existence and development aspects of interest to the people of Kenya, and along which all national and sectoral legislative documents are drawn. In relation to the environment, article 42 of chapter four and the Bill of Rights confers to every person the right to a clean and health environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative measures, particularly those contemplated in article 69, and to have obligations relating to the environment fulfilled under Article 70. Environmental impact assessment is a tool for environmental conservation and has been identified as a key component in new project implementation. According to section 58 of the Environmental Management and Coordination Act (EMCA Cap 387), second schedule and Environmental (Impact Assessment and Audit) Regulation, 2003, both new and old projects must undergo Environmental Impact Assessment and Audits. The report of the same must be submitted to NEMA for review/approval and issuance of the relevant certificates/licenses. This was necessary as many forms of developmental activities cause damage to the environment and hence the greatest challenge today is to maintain sustainable development without interfering with the environment.

4.6.2 Environmental Problems in Kenya

There are many environmental problems and challenges in Kenya today. Among the cardinal environmental problems include: loss of biodiversity, land degradation, water management and environmental pollution. This has been aggravated by lack of awareness and inadequate information amongst the public on the consequences of their interaction with the environment. In addition, there is limited local communities' involvement in participatory planning and management of environmental and natural resources. Recognizing the importance of natural resources and the environment in general, the Kenyan Government has put in place wide range of policy, institutional and legislative framework to address the major causes of environmental degradation and negative impacts on ecosystem emanating from industrial and economic development programmes. Two major institutions are in place for purpose of administration of the Environmental, namely, National Environmental Council (NEC) and National Environmental Management Authority (NEMA).

4.6.3 National Environmental Council (NEC)

This is a body that is made up of members charged with the duty of natural resource management and conservation with members drawn from all the relevant ministries as well as a broad range of other stakeholders. The functions of the council are to formulate national policies, goals, and objectives and determination of policies and priorities for the environmental protection. The council also promotes co-operation among all the players engaged in environmental protection programmes.

4.6.4 National Environmental Management Authority (NEMA)

NEMA is the organization responsible for the administration of the environmental act. Among the functions of NEMA include;

- C o -ordination of various environmental management activities
- I n i t i a t i o n of legislative proposals and submission of such proposals to Attorney General
- R e s e a r c h , investigate and carry out surveys in the fields of environment
- Enhance environmental education and awareness on the need of sound environmental management
- Advice the government on regional and international agreements to which the country should be a party and issue an annual report on the state of environment
- Charged with the responsibility of the execution of EIA and EA

4.6.5 Kenya Wildlife Service (KWS)

Kenya Wildlife Service (KWS) is a State Corporation established by the Wildlife (Conservation and Management) Act, CAP 376 and The Wildlife (Conservation and Management) (Amendment) Act no. 16 of 1989. They provide for the establishment of national parks and national reserves and define how they are to be managed. The Environmental Management and Coordination Act (EMCA) of 1999 provides for the legal and administrative co-ordination of the diverse sectoral initiatives, including management and conservation of wildlife so as to improve the national capacity for the management of biodiversity and the environment in general. The operations of the KWS are also impacted and guided by other overarching policy and legal frameworks (e.g. those relating to Forests, Fisheries, Mining, Lands, Water, Industry, Rural Development, Agriculture, Local Government, National Security, National Museums and the research programs under KEFRI, KEMFRI and KARI) which necessitate structured and functioning relationships with other GOK departments/agencies and the international and local communities. The overall mandate of KWS is to conserve and manage wildlife in Kenya with the following:

I. Sole jurisdiction over National parks supervisory role in the management of National Reserves, Local and Private Sanctuaries

II. License, control and supervise all wildlife conservation and management activities outside the protected areas

III. Conservation Education and Training

IV. Wildlife Research

4.6.6 Water Regulation, 2021

Water Regulation 2021 has replaced Water Rules, 2007. It has 3 Regulations namely:-
1) Water Services Regulation, 2021
2) Water Harvesting and Storage Regulation,2021 and
3) Water Resources Regulation, 2021\

Water Services Regulation, 2021

This Regulation deals with Water Services.

i. Part 1 deals with Preliminary which basically define terms which have been used in the Regulation and what they imply.

ii. Par II provides County Government Framework for Water Services

iii. Part III defines Operation and Financing of water services providers. It requires a county government to establish a service provider in form of a liability company to offer water and sanitation services.

iv. Part IV deals with effluent and wastewater disposal

v. Part VIII deals with clustering of Water Services on basis of Commercial Viability

vi. Part IX Deals with Bulk Water Supply

vii. Part V requires Water Service Providers to pay requisite fees and levees to Regulatory Boad and Water Resources Authority

viii. Part XI deals with Administration of certain water supply and infrastructure services. It requires anybody who want to drill a borehole or supply water from a different source to get the consent of the Water Service Provider in the area of question

ix. Part XII deals with approvals concerning all works affection the water infrastructure

x. Part XIII requires a WSP to establish an Inspectorate for monitoring and evaluation.

xi. Part IV requires Regulation Board and works Development Agencies to undertake Reporting and Record Keeping

xii. Part XVI requires WSP and Regulatory Boards to adopt mechanisms of engagement in their operations

xiii. Part XVIII defines General Offences Schedules -Water Services Regulation has 2 schedules 1-Lays modalities of conducting business while 2 deals with ways of handling complaints.

The Water Harvesting and Storage Regulations, 2021

It is divided into 10 parts as follows:-

i. Part I-Preliminaries

ii. Part II Classification of Storage Dams and Other Waterworks

iii. Part III Development of Water Works

iv. Part Release of water from storage dams and other water works.

v. Part V Maintenance and Management of Water Works

vi. Part IVStrategic Water Emergency Interventions

vii. Part VII Climate changes and flood mitigation

viii. Part VIII Water Harvesting

ix. Part IX-Licensing of Qualified Professionals and Contractors in respect to water works

x. Part C General Offences

It has Five Schedules as follows:-

1. Classification of Dams
2. Risk Categorization of dams and Other Water Works
3. Content and Format of Technical Reports
4. Premiums for use of water from storage facilities and
5. Complaints

The Water Resources Regulation, 2021

Is divided into 15 parts as follows:-

1. Part 1 Preliminary
2. Part II Description of Water Use Activities
3. Part III Application for a permit or other Authority for water use
4. Part IVSurface Water
5. Part V Ground Water
6. Part VIWater Quality Monitoring and Waste Disposal
7. Part VII Works
8. Part VII Conditions of Authorization, permits and Approved water uses
9. Part IX Water use charges
10. Part X Water Resource Users Association
11. Part XIBasin Water Resource Committees
12. Part XII Protected Areas and around Water Conservation areas
13. Part XIII The Reserve
14. Part XIV Registration of Water Sector Professionals

15. Part XV Licensing of Contractors

16. Part XVI Miscellaneous-Contains WRA Standard Forms

4.7 Permits and Licenses

The below listed permits and licenses will be required before the Project is rated compliant to statutory county and national government regulations. The Contractor shall ensure that all pertinent permits, certificates and licenses have been obtained prior to any activities commencing on site and are strictly enforced/ adhered to;

- Environment License issued by NEMA and per the provisions of the EMCA 1999 Cap 387
- The license in Department of Occupational Health and Safety Registration (DOSH).
- Approval of Plans by Marsabit County Government Physical Planning Department of any structures on site.

The Contractor shall maintain a database of all pertinent permits and licenses required for the contract as a whole and for pertinent activities for the duration of the contract.

CHAPTER 5: SITE BASELINE INFORMATION

5.1 Study Area

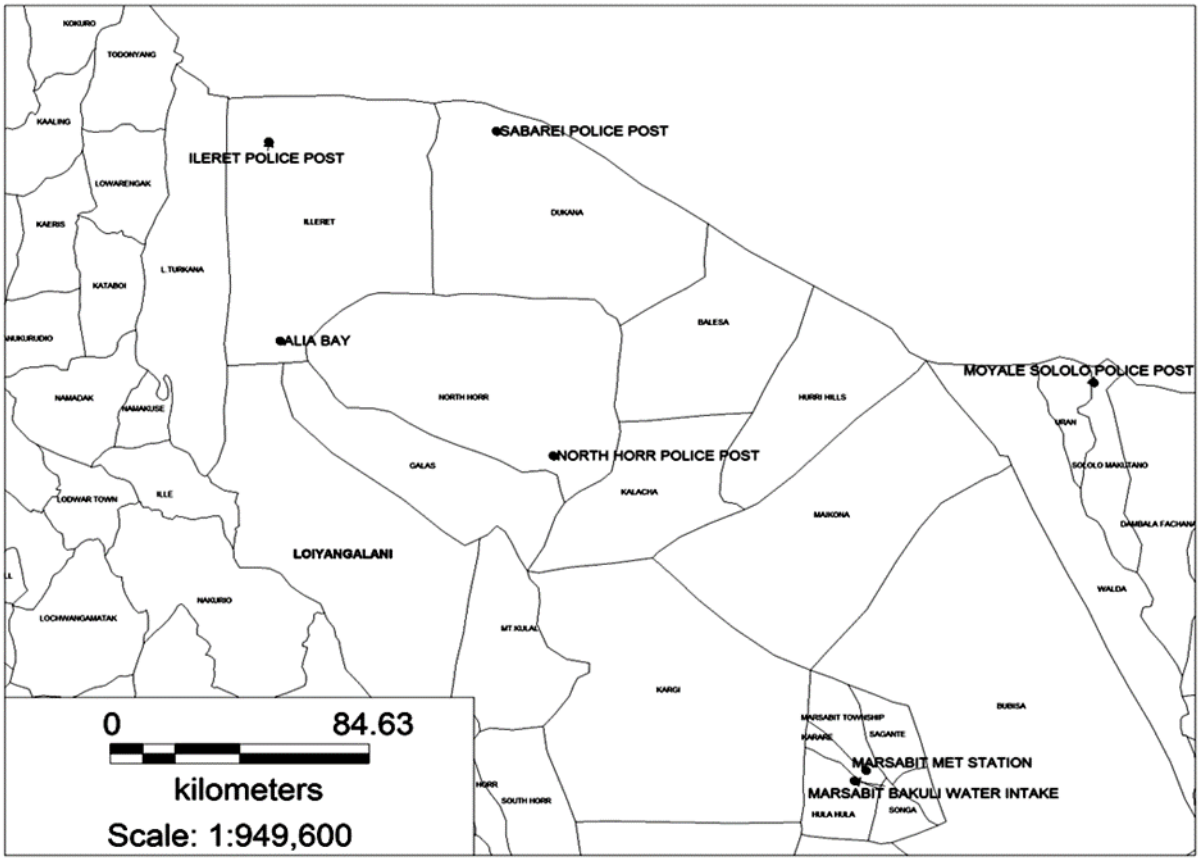
Loiyangalani is located over 250km away from Marsabit town in a zone classified as an oasis near the eastern shows of Lake Turkana. It sits between $2^0$10’ and 2^0 40’ North of Equator and between 36^0 10’ E of Greenwich meridian and the Lake Turkana shore, at an altitude of about 370m above sea level.

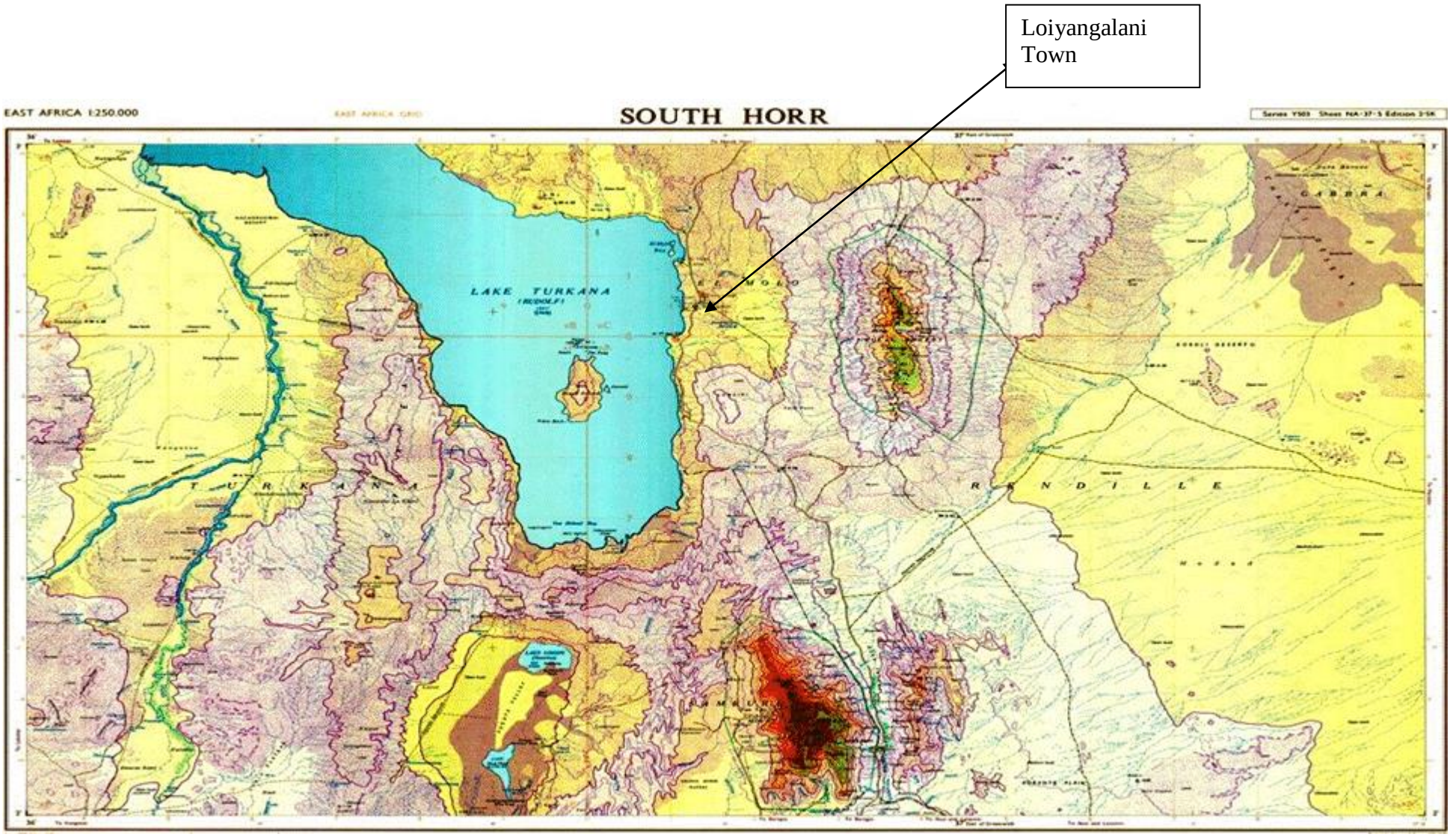
Loiyangalani is located in Laisamis Constituency, the town is located on the southeastern coast of Lake Turkana in Kenya. The town has a population of approximately 5,117 according to the 2019 census. Loiyangalani means "a place of many trees" in the native Samburu tongue. It is home to Turkana people and was founded near a freshwater spring in the 1960s where the El Molo people live. Its main industries include fishing, tourism and gold mining. It is a popular tourist destination in Northern Kenya, as the surrounding El Molo and Turkana villages offer unique (although somewhat commercialized) experiences.

The town is a sub-county in Marsabit County and is few divisions and villages. The targeted study area included 15 villages from two different Sub-locations, namely Loiyangalani and El-Molo. The villages were Nahagan, Kiwanja, Kulamawe, Kulapesa, Kulasamaki, St. Martin, Town, Soweto, Kilimambogo, Dikilkimat, Nawapa, Nakwamekwi, Achukule, Nawoitorong and Komote Village.

Komote Village is an Island in Lake Turkana approximately 7kms from the town. Its people mostly the young ones are greatly affected by the water from the Lake which isn’t safe for human consumption without treatment. The place also is the habitat of the El-Molo people who are a tourist attraction being the among smallest tribe in the Kenya

Map showinh Loiyangalani Subcounty





Map Showing Loiyangalani Town

5.2 Overview of the project area

Loiyangalani is a very remote town. Its residents are very poor people with low income. 94% of the Town consists mainly of low-class housing including grass huts, mud huts and tin shacks.

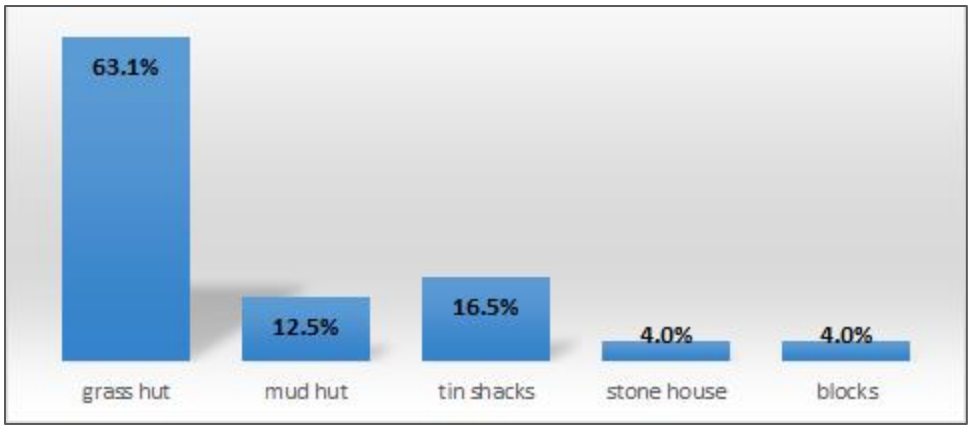


Figure E.1: House building materials in Loiyangalani

(Source – Socio-economic studies by Kiri in June 2022)

Figure E.2: Photo 1 showing houses in Loiyangalani Town

It is difficult to simulate the likelihood of rapid population growth or development as the **entire sub location** did not grow significantly in the last 10 years. According to 2009 Census, Loiyangalani Sub location had a total population of 7251 people and in 2019, they were 7815 in 2019, a difference of only 564 persons in 10 years.

Table 3: Summary of recorded population per Census (1979 – 2019)

Year	Population (inhab.)
2009	7251(Loiyangalani **Sub-location**)
2019	7815(Loiyangalani **Sub-location**)

5.3 General Climate and Rainfall

Broadly, the immediate project area can be characterized as having a very arid and fairly hot climate, with desert scrub vegetation.

According to the Marsabit County Integrated Development Plan (CIDP) 2018-2022, most areas, including Loiyangalani, experience arid climatic conditions. The area receives annual rainfall estimated to be less than 250mm, with significant fluctuations ranging from a maximum of about 500mm to a minimum of about 25mm. Most of the rain falls between March and May.

The rainfall in the project area exhibits a distinct bimodal distribution pattern. The main wet season (long rains) typically begins in March/April and continues until May, while the short rains start in October/November and last until December.

In addition to the low rainfall, an important characteristic of the rainfall is its high variability, including monthly deviations from the mean and variability in altitude and spatial distribution. Although specific data for the project area is unavailable, it is evident that evaporation rates are very high, and the water requirement for crops exceeds the rainfall throughout the year.

Figure E3: The Shores of Lake Turkana on Loiyangalani Town Side

Figure E4: Part of Loiyangalani Town. Illustration of the aridity of the area

5.4 Population Projection

The design horizon for this project extends over a 20-year period from the initial year. For this study, the following critical years have been identified:

- 2025 as the initial year
- 2035 as the future year
- 2045 as the ultimate year

The population projection of Loiyangalani Town was done from previous Census data. In this Study, a 2.75% growth rate has been adopted for Loiyangalani Town.

Table 4:: Evolution of population for urban, peri-urban and rural area

Place	Sub-location	Year	Urban	Rural	Total per area
*Loiyangalani **Town***	*Loiyangalani*	2019	5,193	548	5,741
Komote Village	*El Molo Bay*			306	306
Loiyangalani Town	*Loiyangalani*	2021	5,483	579	6,061
Komote Village	*El Molo Bay*		-	323	323
Loiyangalani Town	*Loiyangalani*	2025	6,111	645	6,756
Komote Village	*El Molo Bay*		-	360	360
Loiyangalani Town	*Loiyangalani*	2035	8,015	846	8,861
Komote Village	*El Molo Bay*		-	472	472
Loiyangalani Town	*Loiyangalani*	2045	10,513	1,109	11,623
Komote Village	*El Molo Bay*		-	620	620

5.5 Population Density

To understand the resettlement requirements and possibility of having Project Affected Persons arising from displaced persons, it is imperative to consider population density. The population density is very

low. There are no squatters. No one has encroached on road reserves as there is more land space than the population can occupy. There are no road-side kiosks or vibandas. The above photo (E.2. is part of Central Business District of the Town. It is a town than no other in Kenya.

The following Table shows relative densities in Loiyangalani Town per village. The highest is 55 persons/Ha in Kula Pesa/Achukule Village with the lowest (4 persons/Ha) in Nawapa Village based on 2019 population data. This is expected to increase to 84persons/ha in 2035 in Kula Pesa/Achukule.

Table 5: Population densities in Loiyangalani Town

Village	Area(km2)	2019 Total Population	2025	2035	2045	2019 pop density (person /ha)	2025 pop density (person /ha)	2035 pop density (person /ha)	2045 pop density (person /ha)
Dikilikimat	0.42	472	555	729	956	**11**	**13**	**18**	**23**
Kilimambogo	0.21	449	528	693	909	**21**	**25**	**32**	**43**
Kiwanja Ndege	0.8	471	554	727	954	**6**	**7**	**9**	**12**
Kula Mawe	0.69	668	786	1031	1352	**10**	**11**	**15**	**20**
Kula Pesa/Achukule	0.11	616	725	951	1247	**55**	**64**	**84**	**111**
Kula Samaki	0.77	614	723	948	1243	**8**	**9**	**12**	**16**
Naagan	0.5	148	174	228	300	**3**	**3**	**5**	**6**
Nakwamekwi	0.81	451	531	696	913	**6**	**7**	**9**	**11**
Nawapa	1.00	421	495	650	852	**4**	**5**	**6**	**9**
Santur	1.00	355	418	548	719	**4**	**4**	**5**	**7**
Soweto/Town	0.27	480	565	741	972	**18**	**21**	**28**	**36**
St.Martins	0.75	341	401	526	690	**5**	**5**	**7**	**9**
Komote	0.64	306	360	472	620	**5**	**6**	**7**	**10**

(**Source**: Consultant's own work, based on KNBS 2019 Census populations data)

5.6 Bio-Physical Baseline Information

5.6.1 Rainfall and Temperature

The climate is basically hot and very dry categorized Agro-climatic Zone VII. This zone is characterised by very low rainfall and very high evapotranspiration. The area is semi-arid and annual rainfall is estimated to less than 250mm. However, the annual rainfall fluctuates widely with a maximum of about 500mm to a minimum of about 25mm, with most rain falling between March and May. The rainfall of the project area shows a distinct bimodal distribution pattern. The main wet Season (long rains) normally starts in March/April and lasts until May. The short rains start in

October/November and last until December. In addition to the low rainfall received in the project area, an important characteristic of the rainfall received is the high variability. This includes monthly rainfall variability or deviations from the mean as well as variability in altitude and spatial distribution. Although no data is available for the project area, it is evident that evaporation is very high and the crop water requirement exceeds rainfall in all months of the year.

Generally temperatures of the project area are high. The temperature patterns usually follow the general trends in the tropics where diurnal changes are greater than annual temperatures. The mean monthly temperature of the project area are in the range of 27 - 29^{0}C, the mean minimal lie around 13^0 – 20^{0}C while the mean maxima are 26^0 – 35^{0}C, though some areas in Loiyangalani record as high as 40^{0}C. The coolest months are July and August while February, March and October are the hottest months.

5.6.2 Topography

Around Loiyangalani Township and bordering Lake Turkana the topographical features are mainly dissected lacustrine plain, floodplain and piedmont plains. The plains have a relief intensity of 5-20 and slopes of 0-8%. The relief of the plains ranges from flat to very gently undulating, gently undulating and undulating.

5.6.3 Geology and Soils

The area is generally covered by sandy soils to gravely rounded particles that portray lacustrine origin which are in turn underlain by basaltic lava. The shores of two existing islands in the lake are made up of lava flows which depict pillow lavas suggesting the lava flew into formerly a larger lake which diminished due to successive lava flows. The hilly ridges are a result of successive lava Basaltic flows, further, the soils are sandy to gravely that portray lacustrine origin.

The hydrogeology of an area is normally intimately dependent upon the nature of the parent rock, structural features, weathering processes and the form frequency of precipitation .The regional hydrogeology where the project area lies is mainly characterized by volcanic rocks and lacustrine deposits. The deposits which are pure, unconsolidated sands are highly transmissible. However, the permeability rapidly decreases in the presence of clays, even if their portion is very small. Heavy clays, which may be marked by porosity as high as 50% have low transmissivity. Clay do not transmit water due to their impervious character. Groundwater in the sedimentary rocks is limited to pores, fractures, faults and erosion levels within the sedimentary successions.

5.6.4 Drainage and Hydrology

The drainage ways in the project area are dry river beds referred to as laggas. These drainage ways have boulders and stony riverbeds. Many laggas in the project area seem to be too wide for the existing climatic conditions. They have wide beds with braided characteristics and changing stream channels. Sometimes, once in every 5 to 10 years, the laggas are filled up completely.

There are a variety of sources of water for the population and livestock in the project area. They consist of permanent springs and boreholes. An important source of permanent water is Loiyangalani Springs which provides water for the community and livestock around this area. Permanent surface water is found in Mt. Kulal but this source of water is outside the project area.

Lake Turkana (6,750 km2) is the largest body of water in the project area. This lake has been in existence since at least early Miocene but has varied in size since then. It was this temporary connection that permitted the ingress of a Nilotic fauna to the lake. The lake is fed by 12 principal rivers of which the largest affluent is the Omo River. This river originates from the Ethiopian highlands, flows south down the Rift Valley and enters the northern extremity of Lake Turkana through a large and swampy delta. The Omo River contributes more than 90% of the total riverine inflow of the lake. The Kerio and Turkwell Rivers, although perennial rivers in the upper reach, both discharge into the lake for a few months each year.

5.6.5 Vegetation Cover

Loiyangalani is a semi-arid area falling in the ecological zone VII. Zone V, this zone receives rainfall of less than 250mm annually and is characterized by low trees, grass and shrubs. The rainfall is erratic and short, making it un-favorable for vegetation growth, the area is dominated by acacia species.

5.6.2 Ambient Air Quality

Project activities that have potential to impact air quality would be associated with construction from emissions of air pollutants from temporary power generators, construction equipment, and vehicles. Construction activities will also create dust.

The following would be expected during construction.

- Emissions of oxides of nitrogen (NO_2 in particular) mainly from construction-related vehicles (and to a lesser degree from construction generators and other hydrocarbon powered equipment); and
- Dust and particulate matter (as PM_{10}) created by construction-related vehicle traffic on unpaved roads.

The focus of the Environment Assessment was identify that at the ESIA stage ambient Sulphur Oxides (SOx), Nitrogen Oxides (NOx) Particulate matter (PM) and Volatile Organic Compounds (VOC) will be analyzed. The baseline of the parameters listed above will provide a basis for subsequent emissions monitoring during construction of the sewer line.

International Finance Corporation (IFC) and World Bank Group Environmental, Health, and Safety (EHS) General Guidelines of April 30, 2007 and Legal Notice no 34 Air Quality Regulations, 2014 of the Environmental Management and Coordination Act 1999 Cap 384 provide acceptable emission estimation and dispersion modeling approaches for point and fugitive sources as summarized in **Table 6.1** below.

Table 5.6:Ambient Air Quality Guidelines[2]

Parameter	Averaging Period	Guideline Value in mg/m^3 for Industrial
Sulfur dioxide (SO2)	Annual Average*	80 $\mu g/m^3$
	24 hours**	125 $\mu g/m^3$
Nitrogen dioxide (NO2)	Annual Average*	80 $\mu g/m^3$
	24 hours**	150 $\mu g/m^3$
Particulate Matter PM (<10 m) (RPM)	Annual Average*	70 $\mu g/m^3$
	24 hours**	150 $\mu g/m^3$
Volatile Organic Compounds (VOC)	24 hours**	600 $\mu g/m^3$

5.6.3 Noise and Excessive Vibrations.

[2] *Source: Legal notice no.34 of Environmental Management and Co-Ordination Act (no 8 of 1999) -The Environmental Management and Co-Ordination (Air Quality) Regulations, 2014- Fifth Schedule.*

The Environmental Management and Coordination (Noise And Excessive Vibration Pollution) (Control) Regulations, 2009 provides under general provisions that except as otherwise provided in the Regulations, no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

Part III Clause 11 provides that any person wishing to engage in any commercial or industrial activity, which is likely to emit noise or excessive vibrations shall carry out the activity or activities within the relevant levels prescribed in the First Schedule to the Regulation. **Table 6.2** below illustrates allowable noise level that will be applicable to the Project at the time of construction of the sewer lines.

Table 5.7: Permissible Noise Levels[3]

Zone	Sound Level Limits dB(A) (Leq,14 h)		Noise Rating Level (NR) (Leq,14 h)	
	Day	Night	Day	Night
Mixed residential (with some commercial and places of entertainment)	55	35	50	25

5.7 Socio Economic Baseline Information

5.7.1 Population of the Settlement

Loiyangalani Town and Komote Village, the target of this assessment is located within Loiyangalani Sub County, Loiyangalani Location. The Town is divided into 14 villages with approximate population[4] of 5,486 persons and Komote village with an approximate population of 306 persons. This number maybe untrue reflection of the actual population size as some of the people here practice pastoralism and they shift places of residence to look for greener pastures when there's drought and famine, Loiyangalani Location is made up of fourteen villages namely; *Dikilkimat, Kilimambogo, Kiwanja Ndege, Kula Mawe, Kula Pesa, Kula Samaki, Nahagan, Nakwamekwi, Nawapa, Soweto, Town, Achukule, Nawaitorong and Komote Village in El-Molo Sub location*.

5.7.2 Land Ownership and Settlements Patterns

Most of the land in the county is owned communally except a few adjudicated sections in Saku and Moyale constituency. The mean holding size of adjudicated sections is 0.8ha, which is slightly low compared to the national mean holding of 0.97ha per household. Land adjudication has started in some areas and plans are underway to roll out the adjudication exercise countywide. The transition to a sedentary livelihood away from pastoral systems has created pressure on grazing land. In the recent past, there is also an increase in the numbers of conservancies, which may significantly change the land use going forward.

The settlement patterns around the town is highly dispersed and scattered, primarily influenced by access to water, land productivity, proximity to roads and other services like security. Thus most settlements are mainly found in areas of relative potential, availability of water, pastures, security and other social services. The nature of these settlements imply that the cost of social service and infrastructure provisions are very high. Settlement patterns across the county are predominantly rural

[3] legal Notice no. 61: the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 – First Schedule

[4] Source: Second Marsabit County Integrated Development Plan (CIDP 2018-2022)

with some few settlements in two major towns of Marsabit and Moyale. Emerging urban centres include Nana, Godoma, Dabel, Loiyangalani, Korr, Kargi, North Horr and Chalbi and centres along the Isiolo - Moyale highway like Merille, Laisamis, Logologo, Karare, Manyatta Jillo, Turbi and Sololo, among others.

Figure 5.1: Photographs of settlements in Loiyangalani

5.7.3 Existing Heath Facilities

The town has two main health care facilities that is the Loiayangalani Health Centre, which is a Public facility and Catholic Mission Health Centre. On your way to El- Molo bay there exist a small dispensary serving the people of Komote Village. Photographs below illustrate images of the hospital

Figure 5.2: Photographs of Loiyangalani Health Centre and El-Molo Bay Dispensary

However, there are also chemist and small clinics around the town which also offer medical help and provide alternative facilities to residents seeking treatment of minor illness.

5.7.4 Road Infrastructure

The town has poor road network which mostly become impassable when it rains heavily, However, within some areas are partly upgraded to marram by Marsabit County Government while other are not. Way-leave reserves for these roads will provide land upon which the water lines and sewer lines will be constructed.

Figure 5.3: Photographs of Road Infrastructure

5.7.5 Education Facilities

Loiyangalani Town has 3 public primary schools, 1 secondary Public school and 1 public primary school in El-Molo Bay as discussed be sub sections below.

Santur Primary School

Santur Primary School has a total population 378 pupils, and is found in Loiyangalani Division particularly the Loiyangalani Zone of Loiyangalani Sub County in Marsabit County. It also lies next to Nakwamekwi,

Dikilkimat, Kula pesa and Nachukule villages. **Table 6.3** below present detailed information about the school.

Table 5-8: Santur Primary School Information

Pupils population	**Boys**	**Girls**	**Total**
	212	166	378
ECD			N/A
Teacher and support staff population	**Male**	**Female**	**Total**
	8	4	4
Sanitation Status	• The school is not connected to reliable water supply • The school has constructed 4 separate units of pit latrines with 2 for boys and 2 for girls. • The pupils carry water to school for use in cleaning.		
Government and NGO (Non-Governmental Organization) Initiatives	• None		
Challenges Faced by the School	• Toilet infrastructure below recommended ratio of at least 1:20 • Toilets fill up often and have to be emptied. • School allocation fund not sustainable and does not provide enough resources to manage the toilets facilities in the school • Teacher under staffing • It's a dry and tough area, most pupils skip school to go herding • Challenges in implementing school feeding program • The school has benefited so little from any government, county or NGO support with regards to sanitation infrastructure.		

Photographs of the School are presented below

Figure 5.4: Photograph of Santur Primary School

Loiyangalani Primary School

Loiyangalani Pry School is a public primary school in Loiyangalani. It is a day school and has a population

of 792 pupils of which 347 are boys and 445 are girls. The number of teachers are 15 in total with 4 females and 11 male**. Table 6.4** below present detailed information about the school.

Table 5-9: Loiyangalani Primary School Information

Pupils Population	**Boys**	**Girls**	**Total**
	347	445	792
ECD population			N/A
Teacher and support staff population	**Male**	**Female**	**Total**
	11	4	15
Sanitation Status	• The School has constructed 16 separate units of pit latrines with a total of 6 latrines for boys 8 for girls and 2 are reserved for teachers		
Government and NGO (Non-Governmental Organization) Initiatives	• Wash your hands initiative		
Challenges Faced by the School	• The school needs support, in its sanitation facilities and other areas • Toilet infrastructure below recommended ratio of at least 1:20 • Toilets fill up often and have to be closed and new ones constructed. • School allocation fund not sustainable and does not provide enough resources to manage the toilets facilities in the school • Teacher under staffing • Challenges in implementing school feeding program		

Photographs of the School are presented below

Figure 5.5: Photograph of LoiyangalaniPrimary School

Titus Ngoyoni Primary School

The school is a public school established after the memory of the late Hon. Titus Ngoyoni. It's also located within Loiyangalani Town outskirts and has a population of 354 pupils and 12 teachers. **Table 6.5** below present's details about the school.

Table 5-10: Titus Ngoyoni Primary School Information

Pupils Population	**Boys**	**Girls**	**Total**
	170	174	344
ECD population			N/A
Teacher and support staff population	**Male**	**Female**	**Total**
	7	4	11
Sanitation Status	• The school has constructed 2 units of pit latrine with a total of 6 doors, 5 doors either side reserved for boys and girls respectively. Teachers have a separate 2 door pit latrine for male and female teachers respectively. • The school has branded health, hygiene and sanitation messages on the walls through the support of washing hands		
Government and NGO (Non-Governmental Organization) Initiatives	• None		
Challenges Faced by the School	• Toilet infrastructure below recommended ratio of at least 1:20 • Toilets fill up often and have to be emptied. • Lack of sufficient water supply for the school • School allocation fund not sustainable and does not provide enough resources to manage the toilets facilities in the school • Teacher under staffing • Challenges in implementing school feeding program		

Figure 5.6: Photograph of NgoyoniPrimary School

Loiyangalani Secondary School

The school is the only public secondary school in the location and has both day and boarding facilities. The school helps to provide a secondary school to pupils within Loiyangalani Town who were graduating from the primary schools. **Table 6.6** below present's details about the secondary school.

Table 5-11: Loiyangalani Secondary School Information

Pupils Population	**Boys**	**Girls**	**Total**
	118	43	161
Teacher and support staff population	**Male**	**Female**	**Total**
	8	1	9
Sanitation Status	School has constructed 1 single unit of pit latrine with a total of 4 doors for girls and 8 doors for boys.		
Challenges Faced by the School	• Toilet infrastructure below recommended ratio of at least 1:20 • Toilets fill up often and have to be buried • School allocation fund not sustainable and does not provide enough resources to manage the toilets facilities in the school		

Figure 5.7: Photograph of Loiyangalani Secondary School

Loiyangalani Vocational Training Centre

The school is a public tertiary institution in the area. It's still new and some facilities are construction. **Table 6.7** on below present's details about the school.

Table 5-12: Loiyangalani Vocational Training Centre Information

Pupils Population	**Boys**	**Girls**	**Total**
	22	32	54
ECD population			N/A
Teacher and support staff population	**Male**	**Female**	**Total**
	2	2	4
Sanitation Status	• The school isn't connected to any water supply hence a huge challenge • Currently both teachers and students share the pit latrines which are only 2, one for the ladies and the other for the males • Some latrines for the teaching staff are under construction. • The school has no washing units within the school compound		
Government and NGO (Non-Governmental Organization) Initiatives	Ministry of Education		

Figure 5.8: Photograph of Loiyangalani Vocational Collage

From literature, other learning institutions include

- Elmolo bay primary and nursery school.
- Titus Ngoyoni primary and
- Loisek Secondary School
- Consolata nursery school.
- Kiwanja nursery school.
- Laiyeni nursery school.
- Komote nursery school.
- Nawetolong Nursery school

5.7.6 Water Supply Baseline

Springs

The current water supply depends on uncoordinated spring intakes developed in the upper areas of the town.

The first source known as the Maji Moto has a high yield and is reported to have been developed by the AIC mission and the government. This source calls for thorough hydrogeological investigations as it seems to have a high potential as a water source. It serves upper town, the lodges, Kula Pesa, Santur Primary School, St. Martin Village, El-Molo lodge, Health Centre, Town Centre and two communal water points (CWP). A second extraction point in Maji moto springs area was dry when the consortium team visited on 28th January 2021.

The AIC managed spring water was reported to be treated every 6 months. The water from the government source is not treated.

The distribution pipes are uPVC. The water source is not well developed, the storage is inadequate.

There is a service tank that was meant to collect water from Maji moto spring but the workmanship was reported to be poor leading to high leakage. Connection to this tank was discontinued.

The other sources are Kiwanja and Nawapa source. Any other area if excavated beyond 10m is expected to yield water but the quality is questionable. The estimated amount of water produced from all the sources is over 550m3 per day.

Water from the Loiyangalani Springs (both the tap water and surface flowing water) is chemically suitable for domestic purposes.

The open defecation noted in the oasis area is an indicator that the quality of water is not assured, even if the sources are protected. A report done in the early 2000s by the Italian Co-operation (Dr Anyumba) showed that most of the water sources east of Mt Kulal had faecal coli forms a bacteria derived from the human intestines. The quality of water is expected to drop as the population grows, and in future other far away sources might need to be explored. The other option is to consider treatment. There has been evidence of Escherichia Coli (E Coli) in the potable water. The indication of this organism is a sure sign of faecal contamination in the water. The water source is unprotected and human settlement is vastly drawing close to the water source. The county administration has indicated need to urgently have the water catchment defined and protected.

The water delivery points are open ended and so the water keeps flowing without control. Out of this revelation, there is a need to have the infrastructure improved. This can be done by storing water (storage tanks) and only release it as required.

Table 5-13: Location of Some of the existing springs in Loiyangalani Town

S/NO	Spring	X COORD	Y COORD
1.	Kiwanja N1	0246786	0306354
2.	Kiwanja N2	0246810	0306398
3.	Kiwanja N3	0246773	0306387
4.	Kiwanja N4	0246764	0306376
5.	Maji Moto		

Boreholes:

Several Boreholes exist in Town. During reconnaissance visit, on 28th January 2021, we were able to confirm the following boreholes:

- Malabo hotel
- El-Molo Lodge
- An additional borehole by AIC missionaries for supplying water to Kiwanja village and Ngoyoni Primary school.

Water of Lake Turkana

Lake Turkana water has high concentrations of total dissolved solids (2381Mg/l) and high pH values (9.56). Although moderately soft, it is saline and requires de – mineralization and pH adjustment before being used for domestic consumption. The northern end of the lake, however, tends to be less saline and more productive than the southern end. The lake is well oxygenated and well mixed due to strong winds which blow over the lake every morning.

It is noted that the salinity of the Lake Turkana water is at a level critical to various fauna. This lake is interesting in the fact that it is the most saline lake in East Africa containing a normal fish fauna. In addition the lake is at the extinction limit for molluscs and at higher salinities, dwarfism of fish would occur.

Water reservoirs

There are several reservoirs in the Town. African Inland Church (AIC) Missionaries have 2 tanks for their own use. They have also constructed a tank of approx. 10,000 litres for use by the Kiwanja village residents.

Community Water Points

There are three community water points in Loiyangalani:

- Kula Samaki
- Kula Pesa
- Kiwanja

Figure 5.9: Community Water Points in Loiyangalani Town

5.7.7 Fishing Industry

Fish industry is not well developed in Marsabit County because of the distance of Lake Turkana from the County headquarter and other potential regional markets. Lake Turkana, as the main source of fish in the county supports 1,400 fishermen and 400 families. The main species of fish are tilapia, labeo and Nile perch. Out of the 10 landing beaches in Lake Turkana, only 4 are gazetted. There are approximately 2,000 fishing nets, 500 hooks, 10 motor boats and 20 canoes. Recently, the county constructed two fish cold storage facilities in Loiyangalani and Illeret. These new developments will reduce post-harvest losses through improved preservation of fish products that are not instantly sold. The county government has acquired two motor boats for monitoring fishing activities and to fight against illegal fishing.

Figure 5.10: Pictures of Lake Turkana from Lake Turkana

5.7.8 Hotel Industry and Tourism

Loiyangalani is a good base for exploring- either by boat to South Island National Park, or by climbing nearby Mount Kulal- a challenging climb which needs to be undertaken with care. El Molo Bay is home to Kenya's smallest tribe, the El Molo whose numbers have dwindled through intermarriage and linguistic and cultural absorption into the Turkana and Samburu communities.

One of the last true hunter-gatherer communities, the El Molo are centered on this small bay, which is also a good place to spot crocodiles and birdlife.
Outside influence has been slow to reach this distant frontier, and the El Molo, Turkana and other communities along the Lakeshores still live lives dictated by tradition, myth and custom.

The town has a number of hotels and lodges for tourist or Non-organization activities that most visit the area, here are a few Lodges in the area, the "Oasis Lodge", the "Palmshade Camp", the "Mosaretu Women's Groupe Lodge", "tila Mari Villas" and the "Sailo Bandas" all located only few munites from the town

Figure 5.11: People of El-Molo during ESIA Visit

5.7.9 Livestock Keeping

Livestock keeping is the main economic activity in Marsabit County. The main livestock kept include approximately 420,000 cattle, 2,029,490 goats, 1,851,452 sheep, 217,360 camels, 81,900 donkeys and 45,860 chicken. There are 5,890 beehives/apiaries in the entire county. But in the target area of Loiyangalani the numbers gotten from the survey were 783 goats, 684 sheep, 136 cows, 56 donkeys and 93 camels. Kindly note that this was just from the sample size representation of the villages. The main livestock products are milk, mutton and camel meat.

Table 5-14: Livestock Numbers

	Total number of livestock				
Village	**Cows**	**Sheep**	**Goat**	**Donkey**	**Camel**
Achu Kule	59	287	256	8	51
Dikilkimat					
El Molo					
Kilimambogo					
Kiwanja	71	208	220	14	23
Kula Mawe					
Kulapesa					
Kulasamaki					
Nahagan					
Nakwamekwi	6	129	170	29	18
Nawapa		32	93	2	
Nawotorong		28	44	3	1
Soweto					
St Martin Village					

Town					
Total	136	684	783	56	93

5.8 Biophysical and Social Receptors

At ESIA stage, social receptors within 10m from the road reserves which will be used to construct the water lines and sanitation lines in the town were identified and mapped. The receptors might suffer damage associated with the Project activities, for instance, if the receptor is a school or a market the risk could be related to be exposed to accident risks associated with plant and equipment movement adjacent to the school. Also, open un-barricaded trenches or open trenches without warning tapes could expose the pupils and general community to accidents. The receptors are summarized in **Table 6-10** below**.**

Table 5-15: Receptors within Loiyangalani Town and El-Molo

Social Receptor	Nature of Receptor	GPS Coordinates
Loiyangalani Market	Market	N 02°45.655' E 036°43.050'
Mowolkiteng	Water Point	37 N 0250289 UTM 0302230
Lardapash	Water Point	37 N 0251913 UTM 0301483
Majimoto Springs	Water Point	37 N 0246911 UTM 0305043
Kiwanja Springs	Community Water Point	37 N 0246914 UTM 0305776
Ngoboleng Spring	Community Water Point	37 N 0249828 UTM 0308637
Nowoitorong Spring	Community Water Point	37 N 0246281 UTM 0302268
Naagan village Spring	Community Water Point	37 N 0246846 UTM 0305396
El Molo Bay Dispensary	Health Centre	N 02°51.381' E 036°42.004'
Catholic Mission Dispensary	Health Centre	N 03°23.215' E 038°33.555'
Loiyangalani Health Centre	Health Centre	N 02°45.806' E 036°43.328'
Loiyangalani Jamia Mosque	Mosque	
Loiyangalani Catholic Church	Church	N 02°45.194' E 036°43.194'
P.A.G – Pentecostal Assemblies of God Loiyangalani	Church	
S.D.A Loiyangalani	Church	
Full Gospel Church of Kenya	Church	
Loiyangalani Vocational Training College	School	N 02°46.681' E 036°42.963'
Titus Ngoyoni Primary School	School	N 02°46.042' E 036°43.460'
Loiyangalani Primary School	School	S 02°45.178' E 036°43.230'
Loiyangalani Secondary School	School	N 03°22.961' E 039°34.035'

Santur Primary School	School	N 02°44.939’ E 036°42.848’

Figure 5.12: *Loiyangalani Mosque and Health Centre*

Figure 5.13: Photographs illustrating existing water points

CHAPTER 6: PROJECT ALTERNATIVES

6.1 Introduction

In this chapter, we explore alternative approaches to address the water and sanitation needs in Loiyangalani. While the proposed solutions outline specific infrastructure and management strategies, it's essential to consider alternative options to ensure the project's effectiveness, sustainability, and adaptability to diverse contexts. By evaluating different alternatives, stakeholders can make informed decisions that maximize the project's benefits while minimizing potential risks and environmental impacts.

6.2 Proposed Loiyangalani Water and Sanitation Project

6.2.1 Background

The proposed Loiyangalani Water and Sanitation Project aims to address the critical water and sanitation needs of the community in Loiyangalani. This comprehensive initiative encompasses the development of water supply infrastructure, sanitation facilities, and management systems to improve public health, enhance livelihoods, and promote sustainable development in the region.

6.2.2 Water Component

The water component of the project involves the implementation of various infrastructure and management measures to ensure reliable access to clean and safe drinking water. Key elements of the water component include:

1. **Abstraction and Raw Water Transmission**: Utilization of boreholes equipped with solar pumps to extract groundwater from the vicinity of Ngobeleng Spring site. This water will then be transmitted through a gravity transmission main pipeline spanning approximately 3 kilometers to ensure efficient distribution.
2. **Water Treatment Facilities**: Installation of water treatment facilities to ensure the purification of raw water before distribution. This includes disinfection processes using calcium hypochlorite and automatic chlorine dosers to maintain water quality standards.
3. **Storage Tanks and Distribution Network**: Construction of ground and elevated storage tanks to store treated water, along with the establishment of a distribution network comprising HDPE and steel pipes, valves, and fittings to facilitate water delivery to communities.
4. **Reverse Osmosis Units**: Deployment of reverse osmosis units in Komote village to meet phase 1 water demand. These units will incorporate pre-treatment processes such as sand and activated carbon filtration, ion exchange resin, cartridge filters, and ultraviolet disinfection to ensure water safety.

6.2.3 Sanitation Component

The sanitation component of the project focuses on improving sanitation infrastructure and management practices to enhance public health and hygiene. Key elements of the sanitation component include:

1. **On-Site Sanitation Facilities**: Construction of on-site sanitation facilities, including ablution blocks, latrines, and faecal sludge treatment plants, to provide access to safe and hygienic sanitation services for residents.
2. **Sludge Drying Beds and Wetland**: Establishment of sludge drying beds and a vertical flow constructed wetland to facilitate the treatment and disposal of faecal sludge in an environmentally sustainable manner.
3. **Community Facilities**: Provision of sanitation facilities in key community locations such as schools, commercial areas, health centers, and public spaces to ensure widespread access to sanitation services.

6.3 Project alternatives

6.3.1 Do nothing alternative

As part of the project evaluation process, a "do nothing" alternative was considered, wherein no intervention is undertaken to address the water and sanitation needs in Loiyangalani. Under this scenario, the existing water sources, including groundwater from springs and potentially Lake Turkana, would continue to be utilized by the community without any additional infrastructure development or management interventions.

However, choosing the "do nothing" alternative would perpetuate the existing challenges faced by the community, including inadequate access to clean and safe drinking water, poor sanitation facilities, and associated health risks. The reliance on untreated water sources, such as springs and Lake Turkana, would expose residents to waterborne diseases and environmental contaminants, further exacerbating public health issues.

Moreover, the sustainability of current water sources is uncertain, given potential impacts from climate change, pollution, and overextraction. Without proactive measures to conserve natural water sources, such as the Mt. Kulal Forest, and mitigate the risks of saline water intrusion from Lake Turkana, the long-term availability and quality of water may deteriorate, leading to more significant challenges in the future.

Overall, selecting the "do nothing" alternative would neglect the urgent water and sanitation needs of the community, perpetuate existing health risks, and undermine efforts towards sustainable development in Loiyangalani. Therefore, this option was deemed inadequate in addressing the pressing issues and ensuring the well-being of residents in the region.

As part of the project evaluation process, a "do nothing" alternative was considered for the establishment of faecal sludge treatment plants and public ablution blocks in Loiyangalani. Under this

scenario, no interventions would be made to improve sanitation infrastructure or management practices, and the current status quo would be maintained.

However, opting for the "do nothing" alternative would perpetuate the existing challenges faced by the community regarding sanitation and hygiene. Without the construction of faecal sludge treatment plants, human waste would continue to be improperly managed, leading to contamination of water sources, soil, and the environment. This could result in the spread of waterborne diseases and pose significant public health risks to the community.

Furthermore, the absence of public ablution blocks would exacerbate sanitation issues, particularly in densely populated areas such as schools, health centers, and public spaces. The lack of access to clean and hygienic toilet facilities would not only compromise public health but also dignity and well-being, especially for vulnerable populations such as women, children, and the elderly.

Moreover, failing to invest in sanitation infrastructure would hinder efforts to promote sustainable development and economic growth in Loiyangalani. Poor sanitation conditions could deter tourism, hinder educational attainment, and impede socio-economic progress, ultimately perpetuating cycles of poverty and inequality in the community.

Overall, selecting the "do nothing" alternative for faecal sludge treatment plants and public ablution blocks would neglect the urgent sanitation needs of the community, compromise public health and well-being, and undermine efforts towards sustainable development. Therefore, this option was deemed inadequate in addressing the pressing issues and ensuring the overall prosperity of residents in the region.

6.3.2 Water Source alternative

Alternative Option 1: Rainwater Harvesting and Storage

Previous assessments were conducted on rainwater harvesting as a potential alternative to groundwater extraction. However, these alternatives were found inadequate due to practical limitations. Loiyangalani experiences irregular rainfall patterns and limited roof surfaces for collection, resulting in insufficient water availability for sustained harvesting. Additionally, the high evaporation rates in the region further reduce the effectiveness of rainwater harvesting. The necessity for significant investment in storage infrastructure also poses economic challenges, making it impractical for widespread implementation. Therefore, despite its potential for supplementing water supply, rainwater harvesting was deemed inadequate to meet the community's needs as a standalone solution.

Alternative Option 2: Desalination of Lake Turkana Water

Explorations were conducted into the feasibility of desalinating Lake Turkana water as an alternative to groundwater extraction. However, practical assessments revealed several inadequacies in this approach. Desalination technologies, particularly suitable for treating seawater, face unique challenges when applied to freshwater sources like Lake Turkana. Lake water contains suspended solids, organic matter, and microbial contaminants that require specialized treatment processes beyond conventional

desalination methods. Moreover, the energy-intensive nature of desalination, combined with the remote location of Lake Turkana, presents logistical and economic hurdles. The disposal of concentrate produced during desalination also poses environmental concerns, as it can affect the lake's ecosystem and water quality.

Furthermore, water quality analysis of Lake Turkana water revealed elevated levels of various contaminants, including total suspended solids, conductivity (EC), sodium, chloride, fluoride, orthophosphates, total dissolved solids, and chromium. These parameters exceed the standards for potable/natural water, indicating the need for extensive treatment before the water can be considered safe for consumption. Consequently, despite its potential to augment water supply, desalination of Lake Turkana water was deemed inadequate as a feasible alternative due to its technical complexities, energy requirements, environmental implications, and poor water quality.

Alternative Option 3: Water Harvesting from Perennial Springs

Previous assessments explored harvesting water directly from perennial springs as an alternative to borehole extraction. However, practical considerations revealed several inadequacies with this approach. While perennial springs offer a continuous flow of water, their capacity may be insufficient to meet the demands of growing populations in Loiyangalani. Moreover, the distance between spring sources and distribution points introduces logistical challenges and increases transmission losses, impacting the efficiency of water delivery. Additionally, reliance on natural spring sources is susceptible to environmental variability and degradation, posing risks to long-term water security. Therefore, despite the potential advantages of utilizing perennial springs, this alternative was deemed inadequate due to practical constraints and uncertainties surrounding sustainability and reliability.

Analyzing the water quality parameters for each spring:

1. Malabo BH:
    - Total Suspended Solids: Exceeded the EAS 12 standards, indicating potential contamination and turbidity issues.
    - Total Viable Count: Exceeded the acceptable limit, suggesting the presence of microbial contaminants, which can pose health risks.
2. Ngobeleng Spring:
    - Total Suspended Solids: Exceeded the EAS 12 standards, indicating potential contamination and turbidity issues.
3. Hot Spring (Maji Moto):
    - Total Suspended Solids: Exceeded the EAS 12 standards, indicating potential contamination and turbidity issues.
    - Total Viable Count: Exceeded the acceptable limit, suggesting the presence of microbial contaminants, which can pose health risks.
4. Nawoitorong Spring:
    - Total Suspended Solids: Exceeded the EAS 12 standards, indicating potential contamination and turbidity issues.
    - Total Viable Count: Exceeded the acceptable limit, suggesting the presence of microbial contaminants, which can pose health risks.

5. Mowokiteng Spring:
    - Total Suspended Solids: Exceeded the EAS 12 standards, indicating potential contamination and turbidity issues.
    - Sodium: Exceeded the acceptable limit, indicating elevated levels of sodium ions, which may affect water taste and health.
    - Barium: Exceeded the acceptable limit, indicating potential contamination from geological sources.
    - Total Viable Count: Exceeded the acceptable limit, suggesting the presence of microbial contaminants, which can pose health risks.
    - Chromium: Exceeded the acceptable limit, indicating potential contamination from industrial or geological sources.
6. Lardapach Spring:
    - Total Suspended Solids: Exceeded the EAS 12 standards, indicating potential contamination and turbidity issues.
    - Chromium: Exceeded the acceptable limit, indicating potential contamination from industrial or geological sources.
    - Total Viable Count: Exceeded the acceptable limit, suggesting the presence of microbial contaminants, which can pose health risks.

Based on the water quality analysis of these springs, it is evident that they suffer from various limitations, including elevated levels of suspended solids, microbial contaminants, and potentially harmful substances such as sodium, barium, and chromium. These contaminants render the spring water unsuitable for direct consumption without adequate treatment. Therefore, relying solely on spring water for the proposed project is not viable due to its compromised quality and associated health risks.

6.3.3 Water treatment, storage and pipelines facilities alternatives

During the feasibility and detailed design phases, various alternative technologies and approaches for water treatment facilities, storage tanks and distribution network, and reverse osmosis units were considered. However, upon thorough evaluation, it was determined that these alternatives were unnecessary given the water quality of the source and the specific requirements of the project.

For the water treatment facilities, alternative methods such as ultraviolet (UV) disinfection and ozonation were reviewed. While these technologies offer advantages in terms of environmental friendliness and microbial inactivation, the existing water quality parameters of the source water were already within acceptable limits. Therefore, additional treatment beyond the planned chemical disinfection using calcium hypochlorite was deemed unnecessary for ensuring water safety.

Similarly, alternative storage solutions such as ferrocement tanks and plastic tanks, as well as alternative distribution systems such as PVC piping and HDPE pipes, were considered. However, the planned construction of ground and elevated storage tanks along with a distribution network comprising HDPE and steel pipes was found to adequately meet the project's requirements. These alternatives were deemed unnecessary as they would entail additional costs without significant added benefits.

Regarding reverse osmosis units, alternative water purification technologies such as electrodeionization (EDI) and nanofiltration (NF) were evaluated. Despite their potential advantages in specific applications, such as removing dissolved ions and organic matter, these technologies were deemed unnecessary for the project. The planned deployment of reverse osmosis units in Komote village was found to effectively meet the water quality standards required to ensure safe drinking water for the community.

Overall, while alternative technologies and approaches were considered during the project planning stages, they were ultimately deemed unnecessary based on the suitability of the planned interventions and the quality of the water source. This decision was made to optimize project resources and ensure that the selected solutions effectively meet the water and sanitation needs of the community in Loiyangalani.

6.3.4 Sanitation Facilities Alternatives and Recommendation:

During the planning and design phases of the project, several alternatives for sanitation facilities were explored to address the sanitation needs of the community in Loiyangalani. After careful consideration and feasibility analysis, the following alternatives were evaluated:

1. Alternative 1: Pit Latrines
    - Pit latrines are a traditional and cost-effective sanitation solution widely used in rural areas.
    - These facilities require minimal construction materials and can be easily maintained by the community.
    - However, pit latrines may pose environmental and health risks if not properly managed, such as groundwater contamination and odour issues.
2. Alternative 2: Pour Flush Toilets with Septic Tanks
    - Pour flush toilets with septic tanks offer improved sanitation compared to pit latrines by reducing odour and preventing groundwater contamination.
    - These toilets require water for flushing but can be connected to existing water sources or rainwater harvesting systems.
    - However, the construction and maintenance of septic tanks may require technical expertise and regular desludging to prevent overflow and environmental pollution.
3. Alternative 3: Ecological Sanitation (EcoSan) Toilets
    - EcoSan toilets are designed to promote sustainable sanitation practices by separating urine and feces for nutrient recycling.
    - These toilets utilize dry sanitation methods, reducing water usage and eliminating the need for sewage infrastructure.
    - However, EcoSan toilets may require community awareness and behavioural change to ensure proper usage and maintenance.

After evaluating these alternatives, it is recommended to implement a combination of pour flush toilets with septic tanks and EcoSan toilets to address the sanitation needs of the community effectively. Pour flush toilets with septic tanks provide a practical and familiar sanitation solution that improves hygiene and reduces health risks associated with open defecation. Simultaneously, integrating EcoSan toilets

offers a sustainable and environmentally friendly approach to sanitation, promoting resource recovery and soil fertility enhancement.

he decision to include a faecal sludge treatment plant (FSTP) as part of the sanitation infrastructure in Loiyangalani was based on a comprehensive evaluation of alternatives and the specific needs of the community. Several factors influenced the selection of an FSTP, including:

1. Environmental Protection: An FSTP was deemed necessary to mitigate the environmental impact of untreated faecal sludge, which poses risks of contamination to water sources, soil, and air quality. Given the dense vegetation and proximity to water bodies in the area, proper treatment of faecal sludge is essential to prevent pollution and protect ecosystem health.
2. Public Health Concerns: The prevalence of waterborne diseases and sanitation-related illnesses in Loiyangalani underscored the importance of proper faecal sludge management. By treating faecal sludge at a centralized facility, the risk of disease transmission and health hazards associated with open defecation and inadequate sanitation practices can be significantly reduced, safeguarding community health.
3. Regulatory Compliance: Compliance with national and international standards for sanitation and environmental protection necessitated the inclusion of an FSTP in the project. Regulatory frameworks prioritize the safe treatment and disposal of faecal sludge to ensure public health and environmental sustainability, making the establishment of an FSTP imperative for project compliance and legitimacy.
4. Long-Term Sustainability: Investing in an FSTP aligns with principles of long-term sustainability and resilience in sanitation infrastructure. By implementing a centralized treatment facility, the project aims to establish robust and scalable solutions that can adapt to future population growth, changing environmental conditions, and evolving sanitation needs in the community.

Throughout the planning process, various alternatives to an FSTP were considered, including decentralized treatment options such as septic tanks and pit latrines. However, these alternatives were deemed inadequate to address the scale and complexity of faecal sludge management challenges in Loiyangalani. Decentralized systems lack the capacity to effectively treat and manage faecal sludge on a community-wide scale, leading to environmental contamination and public health risks.

Ultimately, the selection of an FSTP reflects a holistic approach to sanitation planning that prioritizes environmental protection, public health, regulatory compliance, and long-term sustainability. By investing in centralized faecal sludge treatment infrastructure, the project aims to improve sanitation conditions, enhance community well-being, and contribute to the overall development of Loiyangalani in a safe and sustainable manner.

In the planning and design of the Loiyangalani Water Supply and Sanitation Project, careful consideration was given to the optimal location for the faecal sludge treatment plant (FSTP). While the initially proposed site may have seemed suitable based on various factors such as proximity to the community and accessibility, alternative locations were also evaluated to ensure the most feasible and sustainable solution.

One alternative location that was considered for the FSTP was closer to the source of faecal sludge generation, such as within the community itself or near areas with high population density. This alternative aimed to minimize transportation costs and logistical challenges associated with the collection and disposal of faecal sludge. Additionally, locating the FSTP closer to the community could potentially enhance community ownership and involvement in the sanitation process, promoting awareness and behavioral change regarding proper sanitation practices.

However, upon thorough evaluation, it was determined that the initially proposed site for the FSTP remained the most suitable option for several reasons:

- Environmental Considerations: The initially proposed site was chosen based on its suitability in terms of environmental impact and compatibility with regulatory requirements. It was situated away from sensitive environmental areas, water sources, and residential zones, minimizing potential risks of pollution and ensuring compliance with environmental standards.
- Technical Feasibility: The initially proposed site offered adequate space, infrastructure, and terrain for the construction and operation of the FSTP. It was accessible for vehicles and equipment, facilitating the transportation of faecal sludge and the deployment of treatment technologies. Moreover, the site was compatible with the required utilities such as water supply and electricity, ensuring operational efficiency and effectiveness.
- Community Acceptance: Extensive consultations and engagement with the community were conducted during the site selection process to address concerns and solicit feedback. While alternative locations were considered, the initially proposed site received overall support and approval from community stakeholders, ensuring social acceptance and buy-in for the project.
- Cost-effectiveness: Despite the potential advantages of alternative locations, the initially proposed site was determined to be the most cost-effective option in terms of construction, operation, and maintenance. It offered economies of scale and streamlined logistics for faecal sludge management, optimizing project resources and maximizing long-term sustainability.

In conclusion, while alternative locations for the faecal sludge treatment plant were considered during the planning process, the initially proposed site was ultimately deemed the most suitable and feasible option based on environmental, technical, social, and economic considerations. By selecting the optimal location, the project aims to effectively address sanitation challenges, protect public health, and promote sustainable development in Loiyangalani.

Furthermore, community engagement and capacity building programs should accompany the implementation of sanitation facilities to ensure proper usage, maintenance, and hygiene practices. Additionally, regular monitoring and maintenance schedules should be established to address any issues promptly and sustain the functionality of the sanitation infrastructure over time.

By combining these approaches, the proposed sanitation facilities can enhance public health, improve environmental sustainability, and contribute to the overall well-being and development of the community in Loiyangalani.

6.4 Comparison of Objectives

Under the "Do Nothing" alternative, no changes or developments would be expected to occur in the community of Loiyangalani. Consequently, there would be neither benefits nor significant effects resulting from any project implementation. This scenario would maintain the status quo, perpetuating existing challenges related to inadequate sanitation, limited access to portable water, and associated health risks. The lack of intervention would prolong the community's reliance on unsafe water sources and inadequate sanitation facilities, exacerbating public health issues and hindering socio-economic development.

Contrastingly, the proposed Loiyangalani Water Supply and Sanitation Project aims to bring about transformative impacts in the area. Through the implementation of targeted interventions, such as the construction of water treatment facilities, installation of sanitation infrastructure, and establishment of faecal sludge treatment plants, the project seeks to address the critical needs of the community. By improving sanitation practices and ensuring access to clean and safe drinking water, the project aims to achieve several key objectives:

1. Improved Sanitation: The project endeavors to enhance sanitation conditions in Loiyangalani by providing access to proper sanitation facilities, such as public ablution blocks and faecal sludge treatment plants. This will reduce open defecation, minimize environmental pollution, and mitigate the spread of waterborne diseases, thereby improving public health and hygiene.
2. Access to Potable Water: By developing water supply infrastructure, including boreholes, transmission pipelines, and storage tanks, the project seeks to ensure reliable access to clean and safe drinking water for the community. This will alleviate water scarcity, reduce reliance on contaminated water sources, and enhance overall water quality, contributing to improved health outcomes and well-being.
3. Job Creation: The implementation of the project is expected to generate employment opportunities through various stages, including construction, operation, and maintenance of water and sanitation infrastructure. This will stimulate economic growth, empower local communities, and enhance livelihoods by providing income-generating activities and skills development opportunities.
4. Increased Revenue: Improved access to water and sanitation services can stimulate economic activity and attract investment in the area. The provision of reliable water supply and sanitation infrastructure can enhance the attractiveness of Loiyangalani for businesses, tourism, and other economic ventures, leading to increased revenue generation and economic prosperity.
5. Improved Physical and Social Infrastructure: The project will contribute to the development of essential physical and social infrastructure in Loiyangalani, including roads, schools, health facilities, and community centers. This will enhance overall living standards, promote social cohesion, and strengthen the resilience of the community against environmental and socio-economic challenges.
6. Enhanced Livelihoods: Access to improved water and sanitation services is fundamental to achieving sustainable livelihoods. By ensuring access to clean water for drinking, cooking, and irrigation, and by providing proper sanitation facilities, the project will empower communities to pursue economic activities, improve agricultural productivity, and enhance overall quality of life.

In summary, while the "Do Nothing" alternative offers no benefits or significant effects, the proposed Loiyangalani Water Supply and Sanitation Project presents a comprehensive and transformative solution to address the community's pressing needs. Through improved sanitation, access to potable water, job creation, increased revenue, enhanced infrastructure, and improved livelihoods, the project is poised to bring about positive socio-economic and environmental impacts, making it the most feasible alternative for Loiyangalani.

CHAPTER 7: STAKEHOLDER ENGAGEMENT

7.1 Project Stakeholders

Project stakeholders are defined as individuals, groups or other entities who: (i) are impacted or likely to be impacted directly or indirectly, positively or adversely, by the Project (also known as 'affected parties'); and (ii) may have an interest in the Project ('interested parties'). They include individuals or groups whose interests may be affected by the Project and who have the potential to influence the Project outcomes in any way.

Interactive consultations will be carried out during at Detailed Design Stage and at the detailed ESIA assessment stage to identify priority issues that require in-depth analysis. The subsections below outlines a summary of legal and policy provisions with regards to public participation, stakeholder inventory and proposed approach of stakeholder consultations during ESIA stage.

7.2 Stakeholder Engagement Objectives

The objectives of this stakeholder engagement were as follows;

- To identify and map all relevant stakeholders, their context, interests and concerns;
- To establish a two-way dialogue to understand concerns, management options and external perspectives;
- To manage stakeholders' expectations;
- To facilitate the collection of quality primary and secondary information relevant; to the project processes including monitoring;
- To triangulate data collected and analysis done to inform decision making;
- To document information disclosed and public consultation efforts;
- To comply with regulations and requirements on disclosure and consultation;
- To provide information about the project and its potential impacts to those interested in or affected by the project, and solicit their opinion in this regard;
- To identify additional impacts/issues and possible mitigation measures;
- To inform the process of developing appropriate mitigation measures and facilitate consideration of alternatives and trade-offs (if any);
- To reduce chances of conflict through early identification of contentious issues;
- To ensure transparency and accountability of decision-making; and
- To increase public confidence in the project.

7.3 Stakeholder Mapping and Identification

Stakeholder identification was done in order to determine all organizations and individuals who may be directly or indirectly (positively or negatively) affected by the proposed Loiyangalani Town Water Supply and Sanitation Project. All identified stakeholders will be consulted at the ESIA stage with the motive of collecting their views as regards the project and associated beneficial and adverse impacts.

In summary, the objectives of the stakeholder identification were:

- To identify all the directly impacted stakeholders by the project and its associated facilities;
- To identify the stakeholder groups that are likely to be indirectly impacted by the project activities;
- To identify stakeholder groups whose interests might be impacted by the Project.
- To identify any other stakeholder group that might have an influence on the project.

In the end, the stakeholders were grouped into two main categories depending on their various needs, interest, and potential influence to the project as follows:

Primary Stakeholders: These are stakeholders directly affected by the project such as the local community within Loiyangalani Town and El- Molo village.

Secondary Stakeholders: These are stakeholders indirectly affected by the project but influence development through Project implementation. These include but not limited to: National Government and Marsabit County Government. Inventory of institution relevant to the scope of works in Loyaingalani are listed in **Table 5.1** below.

Table 7.1: Inventory Stakeholder Relevant in Loiyangalani Town

Type	Institution
Primary Stakeholders	
Local Administration	Loiyangalani Location Ass Chief
	El- Molo Sub-location Ass Chief
Learning Institutions	Loiyangalani Primary School
	Santur Primary School
	Titus Ngoyoni Primary School
	Loiyangalani Vocational Training College
	Loiyangalani Secondary School
Secondary Stakeholder	
National Government	Ministry of Water and Sanitation
	Northern Water Works Development Agency
	Ministry of Education
	Ministry of Health
Development Partners	Afd
	African Development Bank (ADB)

7.4 Stakeholder Engagement

During the ESIA Stage three public barazas were organized by the Loiyangalani Chief on the 23rd of June 2022 at the Chiefs Hall where 17nr participant attended and another meeting in February 2024 in Palm shade Resort with 30 participants.

Questionnaires were administered at household level with a sample of 14 households per village, for all 14 villages.

The socioeconomic survey undertaken within Loiyangalani Town and Komote village was guided by the following objectives:

- To understand key social economic conditions of households living within Loiyangalani town.
- To provide socio economic data that is required to inform the design of the proposed water and sanitation interventions under the Project.
- To understand the expectations and concerns of the various stakeholders within the project area and include them in Project formulation.

- To benchmark social economic indicators that will enable NORTHERN Water Works Development Agency (NWWDA) to improve provision of water and sanitation services in the town

For ease of analysis, the villages were categorized into 3 regions as summarized below.

Table 2: Classification of socio-economic Data

S/N	Region 1	Samples	Region 2	Samples	Region 3	Samples
1	Achu Kule	14	Kula Mawe	14	Nawapa	14
2	Dikilkimat	14	Kula Pesa	14	Nawoitorong	14
3	El Molo	16	Kula Samaki	14	Soweto	14
4	Kilimambogo	14	Naagan	14	St Martin Village	14
5	Kiwanja	14	Nakwamekwi	14	Township	14
	Total	**72**		**70**		**70**

The main focus of socio-economic studies was on:

1. Land Ownership and Settlements Patterns
2. Existing Heath Facilities
3. Road Infrastructure
4. Education Facilities
5. Water Supply Baseline
6. Household Characteristics
   - Gender of Respondents
   - Type of House Ownership
   - Number of Rooms
   - Household Size
   - Education Level of Household Head
   - Occupation of Household Members
   - Household Income
   - Household Expenditure
7. Water Supply Characteristics
   - Connection to Water Supply
   - Alternative Water Supply
   - Water Supply Reliability
   - Water Collection for the Household
   - Water source distance, time and transportation
8. Preferred Water Supply
   - Preferred Water Supply
   - Willingness to Pay for Improved Water Supply
   - Willingness to Pay for Water Services Extension
   - Sanitation Excretion Disposal
9. Preferred Sanitation Excretion Disposal
   - Sanitation Services Cost
   - Sanitation Services Accessibility and sharing
   - Households Sharing Sanitation Facilities
   - Health and Hygiene

Table 5.3 below presents a summary of Stakeholder Concerns that were discussed in the public meetings.

Table 7.3: SUMMARY OF STAKEHOLDERS CONCERNS

Suggestion / Question	Response
Stakeholders wanted to know if at all water will be available this time since pipes were laid previously by other projects but water has never flowed.	The meeting was informed that this time the project design has been done properly which includes expansion of treatment plant to treat an additional 2000 cubic meters of water per day. This additional volume will ensure water is available to all residents within the project area.
Residents wanted to know if there will be household connections done under the project.	The meeting was informed that the aim of the Government is to bring services closer to the people. The water line will be brought as close as possible to residents. However, residents will be expected to apply through Marsabit Water and Sanitation Company in order to get a connection. The county government of Marsabit should also come on board and ensure distribution lines are extended progressively to residents who will be far away from the main line. It was also agreed that residents could be pooled together into villages and a T-junction provided to supply them with water.
Residents also wanted to be informed about what can be done to protect their natural springs that are being destroyed by private developers.	Stakeholders were assured that a borehole would be drilled to try and conserve the water from Springs. The chief also suggested an untapped source called Mowolkiteng source which had great potential.
Residents wanted to know if the contractor will source for workforce within the community where the works will be implemented.	Residents were informed that all unskilled labour and some skilled will be sourced from the local community. Youths were encouraged to organize themselves into groups and avail themselves for consideration.

A follow up stakeholder engagement was held on **21/02/2024** to firm up land acquisition and engage further on the current stakeholders in the region. The following was discussed: -

1) Water Treatment Units for Komote Village

The participants were informed that the project also proposed purchasing some reverse Osmosis Units for water treatment for the residents of Komote Island (El-molo Bay). The meeting was told that the community requires consent on the project's implementation, including confirmation of the availability of land for setting up the treatment units, which was specified as half an acre.

The El-Molo Bay representatives informed the meeting that the community will require assurance that the county government will maintain the treatment units in good working condition after the establishment and completion of the project.

The Bay's representative also informed the meeting that there is an ongoing reverse osmosis project currently in Elmolo, and they are worried about duplication of projects in the same area. After discussing the issue with the members and hearing their suggestions, they decided that the Elmolo community requires additional treatment units, and the site for the osmosis unit was to be communicated as early as possible upon identification.

2) Ablution Blocks

It was noted that the issue of hygiene and cleanliness in Loiyangalani Town needed collective responsibility from all town dwellers. There is a need to campaign and sensitize the community members on the importance of cleanliness and proper disposal of faecal matter and waste to prevent outbreaks of diseases like cholera and typhoid, especially during the rainy season. The community's representatives were happy to hear that ablution blocks will be provided in public places. They affirmed their willingness to donate land for the public ablution blocks wherever the project proposed to locate them.

They requested that all public institutions be given priority on water distributions and ablution blocks, including schools, health facilities, polytechnic facilities, police stations, slaughterhouses, and any other institutions.

They proposed that the ablution blocks be constructed to be flushable toilets with proper lighting systems as this will reduce the filling up of the toilets.

3) Community Expectations

The Community representatives listed their expectations upon commencement and completion of the project as follows:

- Clean and sufficient water for human consumption
- Reduction of waterborne diseases
- Bigger population benefits and access to water easily
- Standardized faecal disposal system
- Better infrastructure(roads, schools, markets)
- Proper piping(quality pipes) to prevent breakages and leakages

4) Other Clarifications

- The meeting was informed that cattle troughs will be provided through this project.
- They were also informed that the County Government of Marsabit will operate and maintain the water and sanitation facilities.
- They were informed that the financing model for the Operation and Maintenance phase will depend on the financing model for the project's construction.

CHAPTER 8: DETERMINATION OF ENVIRONMENT AND SOCIAL IMPACTS

8.1 Introduction

The Loiyangalani Water and Sanitation Project represents a pivotal initiative aimed at addressing fundamental needs within the community. With a focus on providing sustainable access to clean water and improved sanitation facilities, this project holds the promise of significant positive impacts on the livelihoods and well-being of the local population. However, it is imperative to acknowledge that such endeavors are not without their challenges and potential repercussions. As such, a comprehensive understanding of the environmental and social impacts associated with each phase of the project is essential for informed decision-making and effective implementation.

The Loiyangalani Water and Sanitation Project, while crucial for community development, presents various environmental and social impacts across its phases. Through the implementation of robust mitigation measures and ongoing monitoring, these impacts can be effectively managed, ensuring the project's sustainability and long-term benefits for the community and the environment.

In this introductory section, we set the stage for the subsequent discussion by highlighting the overarching objectives of the project and the importance of considering its environmental and social dimensions. The Loiyangalani Water and Sanitation Project is not merely a construction endeavor; it is a multifaceted initiative that intersects with ecological, cultural, and socioeconomic dynamics. By recognizing this complexity from the outset, we lay the groundwork for a holistic approach to project planning, execution, and monitoring.

At its core, this project is driven by a commitment to improving the quality of life for the community of Loiyangalani. Access to clean water is not just a basic necessity; it is a fundamental human right that underpins health, education, and economic prosperity. Similarly, adequate sanitation facilities are essential for preserving public health, safeguarding the environment, and upholding human dignity. By addressing these fundamental needs, the project seeks to empower individuals, strengthen communities, and foster sustainable development in the region.

However, alongside these noble aspirations, it is essential to recognize the potential risks and unintended consequences associated with large-scale infrastructure projects. From habitat disruption and natural resource depletion to social displacement and cultural erosion, the impacts of development initiatives can reverberate far beyond their immediate scope. Moreover, in the context of water and sanitation projects, issues of equity, access, and governance often come to the forefront, underscoring the importance of inclusive decision-making and community engagement.

In light of these considerations, this chapter seeks to provide a comprehensive overview of the potential environmental and social impacts associated with the Loiyangalani Water and Sanitation Project. By examining each phase of the project lifecycle—from pre-construction planning to decommissioning—we aim to identify both the beneficial outcomes and the challenges that may arise. Furthermore, we endeavor to propose mitigation measures and best practices to minimize negative impacts and maximize positive outcomes.

Ultimately, our goal is not only to assess the feasibility and viability of the project but also to ensure its alignment with principles of sustainability, resilience, and social equity. By integrating environmental and social considerations into every stage of the project lifecycle, we aspire to create a legacy of lasting positive change for the community of Loiyangalani and future generations to come.

The following structure provides a clear breakdown of the impacts and mitigation measures for each phase of the water and sanitation components, ensuring comprehensive planning and management throughout the project lifecycle.

8.2 Water Supply Component Impacts and Mitigation Measures

The following breakdown provides a detailed overview of the impacts and mitigation measures for each phase of the water supply component, ensuring comprehensive planning and management throughout the project lifecycle.

8.2.1.1 Pre-construction Phase:

Potential Environmental Impacts:

- **Disruption of natural aquifer flow and potential depletion of groundwater resources:** Preparing for water abstraction may involve surveys and exploratory drilling, which can disrupt aquifer flow and potentially deplete groundwater reserves.
- **Habitat Fragmentation:** Pre-construction activities such as access road construction may fragment habitats, leading to biodiversity loss and ecological disturbance.
- **Soil Erosion:** Clearing land for infrastructure development can expose soil to erosion, leading to sedimentation in water bodies and degradation of aquatic habitats.

Potential Social Impacts:

- **Community Consultation:** Pre-construction activities may require land acquisition or access agreements, impacting local communities. Lack of consultation can lead to community opposition and conflicts.
- **Economic Disruption:** Land acquisition or restrictions on land use for water infrastructure may affect livelihoods and traditional land uses of local communities.

Mitigation Measures:

- **Comprehensive Environmental Impact Assessment (EIA):** Conduct thorough EIAs to identify potential environmental and social impacts of pre-construction activities. This includes assessing aquifer dynamics, habitat fragmentation, and potential erosion risks.
- **Habitat Management and Restoration:** Implement habitat management plans to minimize habitat fragmentation and disturbance. This may involve preserving buffer zones around sensitive habitats and undertaking habitat restoration measures.
- **Soil Conservation Practices:** Implement erosion control measures such as vegetative buffers, silt fencing, and erosion-control blankets to minimize soil erosion during pre-construction activities.
- **Stakeholder Engagement:** Engage with local communities and stakeholders early in the planning process. Consultation should be ongoing, transparent, and inclusive, addressing concerns, providing information, and seeking input on project design and implementation.

- **Livelihood Restoration:** Develop livelihood restoration plans to mitigate the economic impacts on affected communities. This may include providing alternative income opportunities, skills training, or compensation for loss of land or resources.

By proactively addressing environmental and social considerations during the pre-construction phase, potential adverse impacts associated with water abstraction and raw water transmission can be minimized, contributing to the sustainable development and acceptance of the water supply project within the local community.

8.2.1.2 Construction Phase

a) Abstraction and Raw Water Transmission:

Potential Environmental Impacts:

- **Disruption of natural aquifer flow and potential depletion of groundwater resources:** Construction activities such as borehole drilling and installation of transmission infrastructure can disrupt the natural flow dynamics of aquifers. This disruption may lead to the depletion of groundwater reserves, impacting water availability for both human consumption and ecological needs.
- **Disturbance to local flora and fauna during borehole drilling and installation:** The construction phase involves intensive activities like borehole drilling, which can disturb the surrounding environment. Noise, vibrations, and the physical presence of machinery may disrupt habitats, nesting sites, and migration routes of local flora and fauna, leading to short-term and potentially long-term ecological impacts.

Potential Social Impacts:

- **Community Displacement:** Land acquisition and construction activities may require the relocation of communities, disrupting livelihoods and community cohesion.
- **Cultural Heritage Impact:** Construction activities could impact culturally significant sites or artifacts, leading to loss of cultural heritage and community identity.

Mitigation Measures:

- **Hydrogeological Assessments:** Conduct comprehensive hydrogeological assessments to understand aquifer characteristics and ensure sustainable abstraction practices.
- **Drilling Techniques:** Utilize drilling techniques and equipment designed to minimize environmental disturbance. This includes employing directional drilling to access groundwater reserves with minimal surface disturbance and implementing noise and vibration mitigation measures to reduce disruption to wildlife.
- **Waste Management:** Implement proper waste management practices to mitigate the environmental impact of drilling fluids and cuttings.
- **Community Engagement:** Engage with affected communities throughout the construction phase, addressing concerns, providing information, and seeking input on project activities.

- **Cultural Heritage Preservation:** Implement measures to identify and protect culturally significant sites or artifacts, consulting with local communities and heritage experts as needed.

By implementing these mitigation measures, the environmental and social impacts of abstraction and raw water transmission infrastructure construction can be minimized, ensuring that the project proceeds in an environmentally responsible manner while safeguarding local ecosystems and water resources.

b) Water Treatment Facilities:

Potential Environmental Impacts:

- **Chemical discharge from water treatment processes:** During the construction phase of water treatment facilities, there is a risk of chemical discharge from various treatment processes. Chemicals such as chlorine, alum, and coagulants may be used for disinfection, flocculation, and other treatment purposes. If not properly managed, these chemicals can leach into water bodies, leading to water pollution and adverse effects on aquatic ecosystems.
- **Energy consumption for water treatment operations:** Construction activities associated with water treatment facilities require energy, contributing to carbon emissions and energy costs. Heavy machinery, pumps, and other equipment used in the construction process consume significant amounts of energy, which can have environmental consequences.

Potential Social Impacts:

- **Health Risks:** Water pollution from chemical discharge can pose health risks to communities relying on affected water sources.
- **Economic Impacts:** Increased energy costs may affect water tariffs and affordability for communities.

Mitigation Measures:

- **Implement eco-friendly treatment processes and chemicals where feasible:** To minimize the environmental impact of chemical discharge, water treatment facilities should prioritize the use of eco-friendly treatment processes and chemicals. This may include adopting alternative disinfection methods such as ultraviolet (UV) treatment or ozonation, which produce fewer harmful by-products compared to traditional chlorination. Additionally, using environmentally friendly coagulants and flocculants can reduce chemical discharge and minimize water pollution.
- **Explore renewable energy sources for powering treatment facilities:** To mitigate the energy consumption associated with water treatment operations, project planners should explore the use of renewable energy sources such as solar, wind, or hydroelectric power. Installing solar panels or wind turbines on-site can help offset energy consumption and reduce reliance on

fossil fuels. Additionally, implementing energy-efficient technologies and optimizing treatment processes can further reduce energy consumption during the construction phase.

- **Community Health Programs:** Implement health education programs to raise awareness of water quality issues and promote safe water practices.
- **Affordability Programs:** Develop programs to mitigate increased water tariffs for communities affected by energy costs.

By implementing these mitigation measures during the construction phase of water treatment facilities, project developers can minimize the environmental impact of chemical discharge and energy consumption, ensuring that the construction process aligns with sustainability goals and environmental regulations. Additionally, addressing social impacts such as health risks and economic implications contributes to the overall sustainability and acceptance of the project within the community.

c) Transmission and Distribution Network:

Potential Environmental Impacts:

- **Habitat disruption during pipeline installation:** Construction activities associated with the transmission and distribution network, such as trenching and excavation for pipeline installation, can disrupt natural habitats and ecosystems. This disruption may lead to habitat fragmentation, loss of biodiversity, and disturbance to sensitive species.
- **Potential leakage and water loss from the distribution network:** Improper installation or handling of pipelines during construction can result in leaks and water losses within the distribution network. These leaks not only waste valuable water resources but can also lead to environmental contamination and damage to surrounding ecosystems.

Potential Social Impacts:

- **Health and Safety Concerns:** Water leakage can pose health risks to communities and compromise water quality. Environmental contamination from leaks can also affect local ecosystems and livelihoods.
- **Economic Impacts:** Water losses can increase operational costs and affect the affordability of water services for communities.

Mitigation Measures:

- **Minimize habitat disturbance through careful route selection and construction practices:** Prioritize route selection that minimizes disruption to natural habitats and ecosystems. Employ construction practices such as horizontal directional drilling (HDD) or trenchless technology to reduce habitat disturbance by minimizing the need for excavation and surface disruption.
- **Implement leak detection systems and regular maintenance:** Install leak detection sensors along the pipeline and conduct regular inspections to identify and address leaks promptly. Proactive maintenance practices during the construction phase can help reduce water losses and environmental impact.

- **Community Awareness and Engagement:** Provide information to local communities about the construction activities, potential impacts, and mitigation measures. Engage with stakeholders to address concerns and solicit feedback throughout the construction process.
- **Compensation and Support:** Provide compensation or support to communities affected by construction activities, including assistance with any temporary disruptions or inconveniences caused by the construction phase.

By implementing these mitigation measures during the construction phase of the transmission and distribution network, project developers can minimize environmental disruption, reduce water losses, and address social concerns, ensuring the sustainable development and acceptance of the water supply project within the local community.

d) Storage Tanks:

Potential Environmental Impacts:

- **Land use change and habitat fragmentation:** The construction of concrete and steel storage tanks may require changes in land use, resulting in habitat fragmentation and alteration of natural ecosystems. This can disrupt local flora and fauna, leading to a loss of biodiversity and ecological imbalance.
- **Potential leakage or contamination from storage facilities:** Improper installation or maintenance of concrete and steel storage tanks can result in leakage or contamination of stored water, posing risks to the environment and human health. Leaks from storage tanks can pollute soil and groundwater, leading to environmental degradation and contamination of drinking water sources.

Potential Social Impacts:

- **Health Risks:** Contamination of soil and groundwater from concrete and steel storage tank leaks can pose health risks to communities, particularly if the water supply becomes contaminated.
- **Economic Impacts:** Environmental cleanup costs and loss of revenue due to water contamination can have economic implications for communities and project stakeholders.

Mitigation Measures:

For Concrete Tanks:

- **Site Selection and Design:** Choose locations for concrete tanks that minimize ecological impacts and conduct environmental assessments before construction begins.
- **Quality Assurance:** Ensure proper construction techniques and quality control measures are implemented during the construction of concrete tanks to minimize the risk of leaks and structural failures.
- **Coating and Waterproofing:** Apply appropriate coatings and waterproofing materials to concrete tanks to prevent water leakage and potential contamination.

- **Regular Inspection and Maintenance:** Implement regular inspection and maintenance programs to identify and address any signs of deterioration or damage promptly. This includes monitoring for cracks, corrosion, and other potential sources of leakage.

For Steel Tanks:

- **Corrosion Protection:** Apply corrosion-resistant coatings and linings to steel tanks to prevent rust and corrosion, which can lead to leaks and structural failures.
- **Quality Assurance:** Ensure proper welding techniques and quality control measures are followed during the fabrication and installation of steel tanks to maintain structural integrity.
- **Cathodic Protection:** Install cathodic protection systems to protect steel tanks from corrosion, particularly in environments where corrosion is a significant concern.
- **Regular Inspection and Maintenance:** Implement regular inspection and maintenance programs to monitor the condition of steel tanks and address any signs of corrosion or deterioration promptly.

By implementing these specific mitigation measures for concrete and steel storage tanks during the construction phase, project developers can minimize environmental disruption, reduce the risk of contamination, and address social concerns, ensuring the overall sustainability and acceptance of the water supply project within the local community.

e) Komote Village Reverse Osmosis Units:

Potential Environmental Impacts:

- **Discharge of brine and chemical waste from reverse osmosis processes:** The operation of reverse osmosis units may result in the discharge of brine and chemical waste, which can have adverse effects on water quality and aquatic ecosystems. Improper disposal of brine and chemicals can lead to water pollution and harm to aquatic life.
- **Energy consumption for operation of treatment units:** Reverse osmosis units require energy for operation, contributing to carbon emissions and energy costs. Energy consumption during the construction phase can have environmental consequences, including greenhouse gas emissions and depletion of natural resources.

Potential Social Impacts:

- **Health Risks:** Water pollution from brine and chemical waste discharge can pose health risks to communities, particularly if the local water supply becomes contaminated.
- **Livelihood Impacts:** Environmental degradation from improper disposal practices can affect fishing and agriculture, impacting the livelihoods of communities reliant on these resources.

Mitigation Measures:

- **Implement brine disposal and chemical handling protocols:** To mitigate the environmental impact of brine and chemical waste discharge, project developers should implement proper

disposal and handling protocols during the construction phase. This may include treating brine and chemical waste to reduce their environmental impact before disposal or exploring alternative disposal methods such as evaporation ponds or injection wells.

- **Explore energy-efficient operation and renewable energy sources:** To minimize the energy consumption associated with reverse osmosis units, project planners should explore opportunities for energy efficiency improvements and integration of renewable energy sources. This may involve installing energy-efficient equipment and systems, optimizing treatment processes to reduce energy consumption, and exploring options for onsite renewable energy generation such as solar or wind power.
- **Community Engagement:** Engage with local communities to raise awareness of the environmental and social impacts associated with reverse osmosis units. Provide information on mitigation measures and solicit input and feedback from community members.
- **Livelihood Support:** Provide support to communities affected by environmental impacts, including assistance with alternative livelihood options and mitigation measures to minimize the impact on local fisheries and agriculture.

By implementing these mitigation measures during the construction phase, project developers can minimize the environmental impact of reverse osmosis units and address social concerns, ensuring that the construction process aligns with sustainability goals and environmental regulations while safeguarding the well-being of local communities.

8.2.1.3 Operation and Maintenance Phase

The operation and maintenance phase of water supply infrastructure is critical for ensuring the sustainability of water resources while minimizing environmental impacts. Here's an elaboration on the potential impacts and mitigation measures outlined for each component:

a) Abstraction and Raw Water Transmission:

Potential Environmental Impacts:

- **Continued disruption of natural aquifer flow and potential depletion of groundwater resources:** This can lead to ecological imbalances and impact water availability for communities and ecosystems.
- **Potential disturbance to local flora and fauna during routine maintenance activities:** Activities like drilling boreholes or installing pumps can disrupt habitats and ecosystems.

Potential Social Impacts:

- **Water Availability:** Depletion of groundwater resources can impact water availability for communities, affecting drinking water access and agricultural practices.
- **Ecosystem Health:** Disruption to local flora and fauna can impact biodiversity and ecosystem services that communities rely on for food, water, and livelihoods.

Mitigation Measures:

- **Continuous monitoring of groundwater levels and aquifer health:** Ensure that water abstraction remains sustainable and does not lead to overexploitation. This helps in maintaining water availability for communities and minimizing ecological imbalances.
- **Implementing borehole maintenance practices:** Schedule maintenance activities during non-sensitive times for local wildlife and use techniques that minimize disturbance. This mitigates impacts on local ecosystems and reduces disruption to habitats.

b) Water Treatment Facilities:

Potential Environmental Impacts:

- **Continued chemical discharge from water treatment processes:** Discharged chemicals can affect water quality in receiving water bodies.
- **Ongoing energy consumption for water treatment operations:** This contributes to greenhouse gas emissions and energy costs.

Potential Social Impacts:

- **Water Quality:** Chemical discharge can affect water quality, posing health risks to communities reliant on treated water sources.
- **Economic Impacts:** Ongoing energy consumption increases operational costs, potentially impacting water tariffs and affordability for communities.

Mitigation Measures:

- **Regular assessment and optimization of treatment processes:** This can help reduce chemical usage and discharge, improving environmental outcomes and minimizing water quality impacts.
- **Implementing energy-saving measures:** Monitoring and optimizing energy consumption can reduce operational costs and environmental footprint, contributing to long-term sustainability and affordability of water supply services.

c) Transmission and Distribution Network:

Potential Environmental Impacts:

- **Continued risk of habitat disruption and potential leakage:** Leaks can lead to water loss and environmental contamination, posing risks to ecosystems.
- **Temporary impact on local ecosystems during maintenance:** Activities like pipe repairs can disrupt habitats and disturb local flora and fauna.

Potential Social Impacts:

- **Water Availability:** Leakage from the distribution network can impact water availability for communities, affecting access to clean water for drinking and sanitation.
- **Ecosystem Health:** Habitat disruption during maintenance activities can affect biodiversity and ecosystem services that communities rely on for their well-being.

Mitigation Measures:

- **Proactive maintenance schedules and leak detection:** Implement regular maintenance and monitoring programs to minimize water loss and environmental impact. Early detection of leaks helps prevent water loss and reduces the risk of contamination.
- **Incorporating environmental considerations:** Use low-impact equipment and techniques during maintenance to reduce ecological disturbance. Consider the timing of maintenance activities to minimize disruption to local ecosystems and wildlife habitats.

d) Storage Tanks:

Potential Environmental Impacts:

- **Risk of land use change and habitat fragmentation:** Construction and expansion of storage facilities can alter landscapes and fragment habitats, leading to habitat loss and biodiversity decline.
- **Potential for leakage or contamination:** Poorly maintained tanks can lead to environmental damage through leakage or contamination of stored water.

Potential Social Impacts:

- **Water Quality:** Contamination from storage tank leaks can impact water quality, posing health risks to communities reliant on stored water sources.
- **Livelihood Impacts:** Environmental degradation from tank leakage can affect local livelihoods, particularly those dependent on agriculture and fisheries.

Mitigation Measures:

- **Regular inspections and maintenance:** Implement routine inspections and maintenance protocols to identify and address issues promptly, preventing environmental harm and ensuring the integrity of storage tanks.
- **Implementing environmental monitoring programs:** Regular monitoring helps detect and mitigate any environmental impacts associated with storage facilities, ensuring early intervention and protection of local ecosystems.

e) Komote Village Reverse Osmosis Units:

Potential Environmental Impacts:

- **Discharge of brine and chemical waste:** Improper disposal can harm aquatic ecosystems and water quality in receiving water bodies.
- **Ongoing energy consumption:** Energy consumption contributes to carbon emissions and environmental footprint.

Potential Social Impacts:

- **Health Risks:** Water pollution from brine and chemical waste discharge can pose health risks to communities reliant on water resources.
- **Economic Impacts:** Ongoing energy consumption increases operational costs, potentially impacting water tariffs and affordability for communities.

Mitigation Measures:

- **Monitoring and optimization of waste disposal:** Proper handling of brine and chemicals minimizes environmental impact, protecting aquatic ecosystems and ensuring water quality.
- **Continuous evaluation of energy consumption:** Identify opportunities for efficiency improvements or renewable energy integration to reduce the environmental footprint and operational costs of reverse osmosis units.

In conclusion, these mitigation measures are essential for minimizing the environmental and social impacts associated with water supply infrastructure during the operation and maintenance phase. By implementing these measures, stakeholders can ensure the long-term sustainability of water resources and minimize harm to local ecosystems and communities.

8.2.1.4 Decommissioning Phase:

a) Environmental Impact:

1. **Habitat Disturbance:**
    - **Impact:** Decommissioning activities can disturb habitats, leading to loss of biodiversity and disruption of ecosystems.
    - **Mitigation Measures:** Conduct thorough habitat assessments prior to decommissioning. Implement measures to minimize disturbance, such as scheduling activities outside of breeding seasons and establishing buffer zones around sensitive habitats.
2. **Soil and Water Contamination:**
    - **Impact:** Release of contaminants from decommissioned infrastructure can lead to soil and water pollution, affecting local ecosystems and human health.
    - **Mitigation Measures:** Implement containment measures during dismantling to prevent the spread of contaminants. Conduct soil and water quality testing before, during, and after decommissioning. Remediate any contamination promptly using appropriate techniques.
3. **Waste Generation and Disposal:**

- **Impact:** Decommissioning generates various types of waste, including hazardous materials, which can pose risks to the environment if not managed properly.
- **Mitigation Measures:** Implement waste management practices following regulatory guidelines. Prioritize waste minimization, recycling, and proper disposal methods. Ensure that waste handling personnel are trained in safe handling procedures.

4. **Air Quality Impacts:**
   - **Impact:** Decommissioning activities may release dust, particulate matter, and emissions, contributing to air pollution.
   - **Mitigation Measures:** Use dust suppression techniques such as water spraying or covering materials. Minimize emissions by properly maintaining equipment and vehicles. Monitor air quality during decommissioning and implement measures to reduce emissions.

b) Social Impact:

1. **Community Disruption:**
   - **Impact:** Decommissioning activities can disrupt communities, affecting livelihoods, access to services, and social cohesion.
   - **Mitigation Measures:** Engage with local communities early in the planning process to address concerns and minimize disruptions. Provide information about the decommissioning process, including timelines and potential impacts. Offer support programs for affected individuals or businesses.
2. **Cultural Heritage Preservation:**
   - **Impact:** Decommissioning may affect cultural heritage sites or artifacts, leading to loss of cultural identity and heritage.
   - **Mitigation Measures:** Conduct cultural heritage assessments to identify and protect significant sites or artifacts. Collaborate with local stakeholders, including Indigenous communities, to develop strategies for preserving cultural heritage during decommissioning.
3. **Economic Impacts:**
   - **Impact:** Decommissioning can have economic implications, including job losses and changes in local economies.
   - **Mitigation Measures:** Develop transition plans to support workers affected by decommissioning, such as retraining programs or assistance with job placement. Explore opportunities for redeveloping decommissioned sites to create new economic opportunities for communities.
4. **Health and Safety:**
   - **Impact:** Decommissioning activities pose risks to the health and safety of workers and nearby residents.
   - **Mitigation Measures:** Implement comprehensive health and safety protocols, including training, personal protective equipment, and emergency response procedures. Communicate risks to workers and the community and provide regular updates on safety measures and precautions.

By addressing these environmental and social impacts and implementing appropriate mitigation measures, decommissioning activities can be conducted in a manner that minimizes negative consequences and promotes the well-being of both the environment and affected communities.

8.2.2 Sanitation Component Impacts and Mitigation Measures

8.2.2.1 Pre-construction Phase:

Environmental Impact:

- **Baseline Disturbance:** Preparing for the construction phase may involve land clearing, vegetation removal, and site surveys, which can disturb local ecosystems and habitats.
- **Potential Contamination:** Site preparation activities such as soil testing and geological surveys may involve the use of chemicals or drilling fluids, posing a risk of soil and water contamination if not managed properly.
- **Noise and Visual Intrusion:** Site preparation activities may generate noise and visual intrusion, impacting the tranquility of the area and potentially disturbing wildlife.

Social Impact:

- **Community Consultation:** Engaging with local communities during the pre-construction phase is crucial to understanding their needs, concerns, and aspirations regarding the sanitation project.
- **Cultural Heritage Preservation:** Pre-construction activities should consider the preservation of cultural heritage sites and artifacts that may exist within the project area, respecting the cultural significance of the land to local communities.
- **Livelihood Impacts:** Site preparation activities may temporarily disrupt local livelihoods, particularly if land clearing affects agricultural or grazing areas relied upon by the community.

Environmental Mitigation:

- **Environmental Impact Assessment (EIA):** Conduct a thorough EIA prior to site preparation activities to assess potential environmental risks and identify appropriate mitigation measures.
- **Sensitive Area Identification:** Identify and map sensitive ecological areas, cultural heritage sites, and critical habitats before site preparation begins, implementing protective measures to minimize disturbance.
- **Chemical Management Plan:** Develop and implement a chemical management plan to ensure proper handling, storage, and disposal of chemicals used during pre-construction activities, minimizing the risk of contamination.
- **Noise and Visual Screening:** Implement measures such as sound barriers and visual screens to minimize the impact of noise and visual intrusion on local communities and wildlife.

Social Mitigation:

- **Community Engagement:** Conduct community consultations and stakeholder meetings to gather input, address concerns, and build trust with local communities prior to site preparation activities.
- **Cultural Heritage Assessment:** Conduct assessments to identify and document cultural heritage sites within the project area, working with local communities to develop strategies for their preservation and protection.
- **Livelihood Support:** Develop livelihood restoration programs to mitigate the temporary impacts of site preparation on local livelihoods, providing alternative income-generating opportunities or support for affected individuals and communities.
- **Information Provision:** Provide clear and timely information to local communities about the purpose, scope, and timeline of pre-construction activities, ensuring transparency and fostering community understanding and support.

By implementing these environmental and social mitigation measures during the pre-construction phase of the Loiyangalani Sanitation Project, stakeholders can minimize negative impacts, promote community engagement and empowerment, and lay the foundation for a successful and sustainable sanitation project.

8.2.2.2 Construction Phase

a) Faecal Sludge Treatment Plant:

Potential Environmental Impacts:

- Odor and visual pollution from sludge drying beds.
- Potential contamination of groundwater from untreated sludge.

Potential Social Impacts:

- Disruption of daily activities and discomfort due to foul odors for nearby residents.
- Concerns about health risks associated with groundwater contamination.

Mitigation Measures:

- Engage with local communities to address concerns and communicate plans for odor control measures and landscaping to minimize visual and olfactory impacts.
- Establish community feedback mechanisms to address any social concerns promptly and transparently.

b) School Ablution Blocks and Commercial Places:

Potential Environmental Impacts:

- Increased water and waste generation from ablution facilities.
- Potential hygiene and sanitation issues if facilities are not properly maintained.

Potential Social Impacts:

- Improved access to sanitation facilities for schools and commercial establishments, enhancing overall hygiene and sanitation standards.
- Employment opportunities for local residents during construction.

Mitigation Measures:

- Implement community awareness programs on proper water usage and waste management to mitigate environmental impacts.
- Provide training and employment opportunities for local residents, fostering social and economic development in the area.

c) **Other Project Components:**

Potential Environmental Impacts:

- Increased traffic and activity in the vicinity of project components.
- Potential pollution from solid waste incineration.

Potential Social Impacts:

- Traffic congestion and safety concerns for local residents and commuters.
- Opportunities for local businesses due to increased economic activity during construction.

Mitigation Measures:

- Develop and implement traffic management plans to minimize disruptions and ensure the safety of local residents and workers.
- Collaborate with local authorities and community leaders to address any social concerns related to increased traffic and activity.

8.2.2.3 Operation and Maintenance Phase

a) Faecal Sludge Treatment Plant:

Potential Environmental Impacts:

- Continued odor and visual pollution from sludge drying beds.
- Risk of groundwater contamination if maintenance protocols are not followed diligently.

Potential Social Impacts:

- Persistent discomfort and nuisance for nearby residents due to ongoing odor issues.
- Concerns about water safety and health risks if there are lapses in maintenance leading to groundwater contamination.

Mitigation Measures:

- Regular maintenance and upkeep of odor control measures to minimize discomfort for nearby residents.
- Implementation of rigorous maintenance protocols to ensure the proper functioning of treatment processes and containment systems, reducing the risk of groundwater contamination.
- Community engagement initiatives to keep local residents informed about maintenance activities and to address any concerns or complaints promptly.

b) School Ablution Blocks and Commercial Places:

Potential Environmental Impacts:

- Continued water and waste generation from ablution facilities.
- Risk of hygiene and sanitation issues if maintenance is neglected.

Potential Social Impacts:

- Continued access to clean and functional sanitation facilities, contributing to improved health and well-being for students and patrons.
- Employment opportunities for maintenance staff, contributing to local economic development.

Mitigation Measures:

- Implement regular inspection and maintenance schedules to ensure the cleanliness and functionality of ablution facilities, reducing the risk of hygiene and sanitation issues.
- Conduct hygiene education and awareness programs to promote proper facility usage and waste disposal practices among users.
- Provide ongoing training and support for maintenance staff to uphold hygiene standards and ensure the longevity of facilities.

c) Other Project Components:

Potential Environmental Impacts:

- Continued traffic and activity around project components.
- Risk of pollution or environmental degradation if maintenance practices are inadequate.

Potential Social Impacts:

- Continued economic benefits for local businesses and service providers due to ongoing project operations.
- Concerns about safety and environmental stewardship if maintenance is not prioritized.

Mitigation Measures:

- Maintain effective traffic management plans to minimize disruptions and ensure the safety of workers and local residents.
- Implement proactive maintenance programs for all project components to minimize environmental risks and ensure continued functionality.
- Foster ongoing collaboration with local stakeholders and authorities to address any social or environmental concerns related to project operations and maintenance.

8.2.2.4 decomissioning Phase:

a) Faecal Sludge Treatment Plant:

Potential Environmental Impacts:

- Odor and visual pollution from sludge drying beds.
- Potential contamination of groundwater from untreated sludge.

Potential Social Impacts:

- Concerns about lingering odors and potential health risks for nearby residents during decommissioning.
- Assurance of proper decommissioning procedures to prevent environmental contamination and ensure community safety.

Mitigation Measures:

- Communicate decommissioning plans and timelines to local communities, addressing any concerns and providing updates on odor control measures and groundwater monitoring.
- Implement community health and safety measures during decommissioning activities to minimize social impacts and ensure the well-being of nearby residents.

b) School Ablution Blocks and Commercial Places:

Potential Environmental Impacts:

- Increased water and waste generation from ablution facilities.
- Potential hygiene and sanitation issues if facilities are not properly maintained.

Potential Social Impacts:

- Loss of access to sanitation facilities for schools and commercial establishments if not properly decommissioned.
- Opportunity for repurposing infrastructure to benefit the community post-decommissioning.

Mitigation Measures:

- Develop decommissioning plans that include proper closure procedures for ablution facilities, ensuring thorough cleaning and disinfection to mitigate any potential hygiene and sanitation issues.
- Engage with local stakeholders to explore options for repurposing infrastructure to meet community needs post-decommissioning, fostering sustainable development and social cohesion.

c) Other Project Components:

Potential Impacts:

- Increased traffic and activity in the vicinity of project components.
- Potential pollution from solid waste incineration.

Mitigation Measures:

- Implement traffic management plans to minimize disruptions.
- Ensure proper operation and maintenance of incineration facilities to minimize emissions.

CHAPTER 9: ENVIRONMENTAL AND SOCIAL RISKS MANAGEMENT PLAN

9.1 Purpose and Objectives of ESMP

The specific objectives of the ESMP are to:

- Serve as a commitment and reference for the contractor to implement the ESMP including conditions of approval from NEMA.
- Serve as a guiding document for the environmental, health and safety monitoring activities during construction and operation of the sewer lines.
- Provide detailed specifications for the management and mitigation of activities that have the potential to impact negatively on the environment, health and safety of workers and community.
- Provide instructions to relevant personnel regarding procedures for protecting the environment and minimizing environmental effects, thereby supporting the operator's goal of minimal or zero incidents.

9.2 ESMP at Construction Stage

The Environmental, Social Management and Monitoring Plan (ESMP) prepared for ESIA for Loiyangalani Water and Sanitation Project is summarized In **Table 8-1 on Page 8.2.**

Table 9.1: Environment and Social Management Monitoring Plan during Construction Stage

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
Impacts on Water Resource	● Site activities such as excavations and levelling could result to the loosening of soils that could result in increased sedimentation and siltation of stormwater drains ● Un-serviced plant and equipment on site could result to oils and fuel leaks that could contaminate storm water drains rising the BoD and adversely affecting aquatic organisms in seasonal Streams.	● All waste water which may be contaminated with oily substances must be managed by an appropriate Waste Management Plan (WMP). ● No hydrocarbon-contaminated water may be discharged into the environment. ● At the construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which includes among other; Soil and Sedimentation Control Plan, Spoil Management Control Plan and Waste Management Plan.	Contractor	● State of natural storm water drainage channels ● Quality of water flowing within storm water drains	Preliminary Sum of Ksh 500,000 to be allowed for water pollution control
Impacts on Soil Resource	● Impacts on Soil includes erosion resulting from activities such as excavation and levelling, clearing of vegetation for infrastructure such as access roads, laydown areas and construction zones ● Soil contamination as a result of possible oil and fuel leaks from un-services plant and equipment on site.	● Vegetation clearing and topsoil disturbance will be minimized. ● Contour temporary and permanent access roads/laydown areas so as to minimize surface water runoff and erosion. ● Sheet and rill erosion of soil shall be prevented where necessary through the use of sand bags, diversion berms, culverts, or other physical means. ● Topsoil shall be stockpiled separate from subsoil. Stockpiles shall not exceed 2 m height, shall be located away from drainage lines, shall be protected from rain and wind erosion, and shall not be contaminated. ● Wherever possible construction work will take place during the dry season. ● Topsoil shall be evenly spread across the cleared areas when reinstated.	Contractor	● State of top soil within active work site ● Level of turbidity of water within storm water drains triggered by Project Activities	Preliminary Sum of Ksh 500,000 to be allowed for soil erosion control

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		● Accelerated erosion from storm events during construction shall be minimized through managing storm water runoff (e.g., velocity control measures). ● Soil backfilled into excavations shall be replaced in the order of removal in order to preserve the soil profile. ● Spread mulch generated from indigenous cleared vegetation across exposed soils after construction ● At construction stage, the contractor will prepare Specific Construction Environment and Social Management Plan (C-ESMP) which included among other; Soil and Sedimentation Control Plan, Spoil Management Control Plan and Waste Management Plan.			
Impacts on Air Quality	● Emissions of oxides of nitrogen (NO2 in particular) mainly from construction-related vehicles (and to a lesser degree from construction generators and other hydrocarbon powered equipment); and ● Dust and particulate matter (as PM10) created by construction-related vehicle traffic on unpaved roads.	**As general measures for all locations:** ● Develop a Dust Management Plan (DMP); ● Record all dust and air quality complaints, identify cause(s), take appropriate measures; ● Liaise with local communities to forewarn of potentially dusty activities; ● Undertake monitoring close to dusty activities, noting that this may be daily visual inspections, or passive/active monitoring as parameter ● Undertake inspections to ensure compliance with the Dust Management Plan; ● Plan potentially dusty activities so that these are located as far from receptors as feasible; ● Erect solid screens if feasible around stockpiles and concrete batching; ● Avoid run off of mud and water and maintain	Contractor	● Compliance level Dust Management Plan ● Services and inspection reports of plant and equipment ● Air quality monitoring report findings ● Number of complaints from community related to dust menace	Preliminary Sum of Ksh 500,000 to be allowed for air pollution control

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		drains in a clean state; ● Remove dusty materials form site as soon as possible if not being re-used. If being re-used, cover or vegetate if possible; ● Impose speed limits on haul routes and in construction compounds to reduce dust generation; ● Minimize drop heights when loading stockpiles or transferring materials; and ● Avoid waste or vegetation burning. **For traffic on unpaved roads:** ● Undertake watering to attenuate dust near sensitive receptors. The duration and frequency of this should be set out in the Dust Management Plan and will consider water availability and any stakeholder grievances; and ● On unpaved roads in use for more than 1 month, consider use of surface and sealants to reduce the use of water and water trucks. Use of lignin-based sealants recommended due to low environmental toxicity. **For excavations and levelling** ● Revegetate exposed areas as soon as feasible; ● Revegetate or cover stockpiles if feasible; ● Expose the minimum area required for the works, and undertake; and exposure on a staged basis to minimize dust blow.			
Noise and Vibrations Impacts	Construction activities and equipment are not expected to result in significant levels of vibration. Equipment that might	● Siting noisy plant and equipment as far away as possible from human settlement, and use of barriers (e.g., site huts, acoustic sheds or partitions) to reduce the level of construction	Contractor	Serviced plant and equipment to manufacturers specification	Preliminary Sum of Ksh 250,000 to be allowed for air

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
	high levels of vibration (such as impact piling or vibratory compaction) will not be used	noise at receptors wherever practicable; ● Where practicable noisy equipment will be orientated to face away from the nearest Human settlement and other receptors; ● Working hours for significant noise generating construction work (including works required to upgrade existing access roads or create new ones), will be daytime only; ● Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, will be used, where practicable; ● Where practicable, stationary equipment will be located in an acoustically treated enclosure; ● For machines with fitted enclosures, doors and door seals will be checked to ensure they are in good working order; also, that the doors close properly against the seals; ● Throttle settings will be reduced and equipment and plant turned off, when not being used; ● Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked; and fitting of mufflers or silencers of the type recommended by manufacturers.			pollution control
Impacts on vegetation cover	Stripping of vegetation cover will be on isolated cases only limited the trees and will have minimal impact to soil structure.	● Avoidance of impacts should be prioritized. However, if not possible then compensatory planting of trees that will be cut by the contractor during works will be undertaken. ● Vegetation shall only be within the well field's only if the vegetation and will interfere with Project construction and/or present a hazard.	Contractor in liaison with KFS	● Number of trees replanted as compensatory trees ● Status of reinstatement of completed sites	Preliminary Sum of Ksh 200,000 to allowed for procurement and planting of

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		● Areas to be cleared shall be agreed and demarcated before the start of the clearing operations to minimize exposure. ● The use of existing cleared or disturbed areas for the Contractor's office, stockpiling of materials etc. shall be encouraged. ● Whenever possible, all damaged areas shall be reinstated and rehabilitated upon completion of the contract to as near pre-construction conditions as possible. ● Rehabilitation of temporary construction sites and pioneer camps (if needed) should be done as swiftly as possible and always with suitable native grasses and other plants			compensatory tree seedling
Community Health Safety and Security Impacts	Increased Project-related traffic, civil works for site preparation including site clearance and excavation and levelling, change to the environment due to increased noise, decreased air quality, inappropriate waste handling or disposal, and accidental leaks and spills, and the presence of the Project workforce all present potential hazards for the health and safety of local communities	● Contractor will develop and monitor the implementation of a Community Health and Safety Management Plan (CHSMP) ● Contractor will develop Emergency Response Plans (ERPs) in cooperation with local emergency authorities and hospitals. ● Contractor will extend the Worker Code of Conduct to include guidelines on worker – community interactions and will provide training on the worker code of conduct to all employees including drivers as part of the induction process. ● Contractor will provide primary health care and first aid at construction office sites to avoid pressure on local healthcare infrastructures. ● Contractor will implement a Community Grievance Mechanism. ● Contractor will develop and implement a Traffic	Contractor	● Number of incidences recorded on site and within communities ● Community satisfactory reports with regards to health and safety ● Reported and addressed grievances on site and from communities	Preliminary Sum of Ksh 250,000 to allowed for addressing Community health and security impacts

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		Management Plan covering aspects such as vehicle safety, driver and passenger behaviour, use of drugs and alcohol, operating hours, rest periods, community education on traffic safety and accident reporting and investigations.			
Worker Health and Safety and Workers Management impacts	Workers' rights including occupational health and safety need to be considered to avoid accidents and injuries, loss of man-hours, labour abuses and to ensure fair treatment, remuneration and working conditions. These issues should be considered not only for those who are directly employed on the Project. The Project could potentially lead to workforce-related social and health issues throughout the life cycle of the Project if worker management and rights do not meet Kenyan law or international best practice.	● Contractor and self-employed contractors will assess the H&S risks related with the tasks to be performed during the construction phase. ● Contractor will ensure that training on health and safety measures is provided to all construction workers prior to starting to work on the Project and that supervisors have adequate experience to deliver on their responsibilities. ● Contractor will implement regular health and safety checks and audits of workers, and subcontractors and implementing sanctions in case of breaches of national standards and the Project's specific standards. Such audits to include workplace H&S; worker contracts, working hours, pay and conditions; housing and food standards. ● Contractor will establish a procedure for the recording and analysis of incidents and lessons learned such that additional actions can be implemented to avoid or minimize occupational health and safety risks. ● Contractor will ensure that facilities and work sites are designed and maintained such that robust barriers are in place to prevent accidents. ● Contractor will ensure that adequate clean water, adequate food and access to medical care is provided to all workers on the worksite and at	Contractor	● Number of incidences recorded on site and within workers ● Workers satisfactory reports with regards to health and safety ● Reported and addressed grievances on site and from workers ● Signed code of conduct	Preliminary Sum of Ksh 250,000 to allowed for addressing Worker's health and security impacts

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		accommodation. ● Contractor will develop and implement a Traffic Management Plan covering aspects such as vehicle safety, driver and passenger behaviour, use of drugs and alcohol, operating hours, rest periods, community education on traffic safety and accident reporting and investigations.			
	Gender-based violence and Sexual Harassment	● Ensure clear human resources policy against sexual harassment that is aligned with national law ● Integrate provisions related to sexual harassment in the employee COC ● Ensure appointed human resources personnel to manage reports of sexual harassment according to policy ● The Contractor shall require his employees, sub-contractors, and any personnel thereof engaged in construction works to individually sign and comply with a Code of Conduct with specific provisions on protection from sexual exploitation and abuse ● The contractor will implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including: - effective and on-going community engagement and consultation, particularly with women and girls; - Review of specific project components that are known to heighten GBV risk at the community level, e.g., compensation schemes; employment schemes for women; etc.	Contractor	● Mitigation plan for GBV occurring at the community level as a result of project implementation ● Number of GBV cases happening at the community level that receive survivor-centered referral and care	Budget as presented above

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		● the contractor shall develop specific plan for mitigating these known risks, e.g., sensitization around gender-equitable approaches to compensation and employment; etc. ● The contractor will ensure adequate referral mechanisms are in place if a case of GBV at the community level			
	Sexual Exploitation and Abuse by project workers against community members	● Develop and implement a SEA action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018). ● The SEA action plan will include how the project will ensure necessary steps are in place for: - Prevention of SEA: including COCs and ongoing sensitization of staff on responsibilities related to the COC and consequences of non-compliance; project-level IEC materials; - Response to SEA: including survivor-centered coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management; - Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the		● SEA Action Plan ● Code of Conduct ● Number of staff trainings ● SEA FP ● Community Liaison trained in PSEA ● IEC materials for workers sites and community ● Discrete SEA reporting pathway ● Relevant policies, e.g., investigations and discipline and whistle blower protection ● Monthly minutes from SEA coordination meetings	Budget as presented above

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
		standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; community-level IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights; ● Management and Coordination: including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle blower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers.			
HIV/AIDs	Spread of communicable diseases and HIV/AIDS	● Sensitize workers and the surrounding communities on awareness, prevention and management of HIV/AIDS and sexual health and rights through staff training, awareness campaigns, multimedia and workshops or during community Barazas. ● Use existing clinics to provide VCT services to construction crew and provision of ARVs for vulnerable community members ● Ensure safety of women and girls in provision of VCT services. ● Work to minimize or altogether eliminate mosquito-breeding sites.	Contractor and NWWDA	● Number of cases of diseases reported ● Rate of absenteeism due to diseases ● No of workers trained on HIV/ AIDS ● Number of gender-disaggregated toilets constructed	Preliminary and General Sum of Ksh 200,000 for awareness and purchase of condoms

RISK	ANTICIPATED IMPACT	MITIGATION	RESPONSIBILITY	MONITORING PARAMETER	BUDGET (Kshs.)
COVID 19	Spread of COVID -19 amongst workers	● The Contractors will develop a SOPs for managing the spread of Covid-19 during project execution and submit them for the approval of the Supervision Engineer and the Client before mobilization. The SOPs shall be in line with the World Bank guidance on COVID-19, Ministry of Health Directives and site-specific project conditions; ● Mandatory provision and use of appropriate Personal Protective Equipment (PPE) shall be required for all project personnel including ● Avoid concentrating of more than 100 workers at one location. Where there are two or more people gathered, maintain social distancing at least 2 meters. All workers and visitors accessing worksites every day or attending meetings shall be subjected to rapid Covid-19 screening which may include temperature check and other vital signs; ● Install handwashing facilities with adequate running water and soap, or sanitizing facilities at entrance to work sites including consultation venues and meetings and ensure they are used; ● Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails etc;	Contractor and NWWDA	● Availability of SOP(s), Training material, PPE, sanitizing facilities ● No of workers sensitized on COVID-19 ● No of hand-washing facilities installed; facemasks and temperature monitors secured, etc.	Preliminary and General Sum of Ksh 200,000 for awareness and purchase of soap, sanitizers, temperature screening gadgets and face masks for workers.
				Sub Total ESMP	**2,850,000.00**

9.3 Statutory Requirements Pre-Commissioning of the WTP

The Occupational health and Safety Act (OSHA 2007) provides below detailed statutory provisions before commission operation of the Water Treatment Plant (WTP).

The measures are listed below.

(i) Register the Augmented Ngolobeleng Water Treatment Plant (WTP) as Workplace with DOSH as required by OSHA 2007

(ii) Undertake risk assessment, safety and health audit and fire safety audit for the WTP

(iii) Prepare safety & health policy, fire safety policy and environment policy for the WTP

(iv) Establish Health and Safety Committee (HSC) for WTP and train members of the committee on;

- *Statutory fire marshal training*
- *Statutory first aid training*
- *Statutory safety and health committee training on Occupational Health and Safety (OSH)*
- *Regular provision of personnel at the Treatment Works with Appropriate Personal Protective Equipment's (PPEs)*

The plan presented under **Table 8.2 on Page 8-12** will guide the Plant Operator to conform to the provisions of OSHA pre- commissioning of the WTP.

Table 9.2: OSHA 2007 Statutory Provisions Pre-Commissioning of the WTP and Faecal Sludge Treatment Facilities.

Activity	Requirement	Conformity Measure	Monitoring Indicator	Responsibility	Timelines	Budget (Ksh)
Registration of the Water Treatment Plant as Works Place with DOSH	OSHA 2007 requires that any workplace with more than 7 employees should be registered as a workplace	*Register the Proposed Ngolobeleng Water Treatment Plant and Faecal Sludge TreatmentFacility as Workplace with DOSH*	Availability of Valid Registration Certificate from DOSH	*WTP Operator*	Immediate	*50,000*
Duties Of Occupiers (Legal Requirements)	• Risk Assessment • Safety and Health Audit • Fire Safety Audit • Initial Environment Audit	*Undertake Risk Assessment, Safety and Health Audit and Fire Safety Ngolobeleng Water Treatment Plant and Faecal Sludge TreatmentFacility*	*Risk assessment, Health and Safety and Fire Safety Reports*	*WTP Operator Management*	Immediate	*100,000*
Management of Polices required at the Water Works	Policies Required: • Safety & Health Policy • Fire Safety Policy • Environment Policy	*Prepare Safety & Health Policy, Fire Safety Policy and Environment Policy Ngolobeleng Water Treatment Plant and Faecal Sludge TreatmentFacility*	*Safety & Health Policy, Fire Safety Policy and Environment Policy displayed at the T/Works*	*WTP Operator Management*	Immediate	*Can be done internally*
Water Works Personnel Trainings Required	Training required: • Statutory: Fire marshal training Training required: • Statutory: First Aid Training Training required: • Statutory: Safety and Health Committee	*Establish of Health and Safety Committee for Ngolobeleng Water Treatment Plant and Faecal Sludge TreatmentFacility Facility and train them on;* • *Statutory Fire marshal training* • *Statutory First Aid Training* • *Statutory Safety and Health Committee training on Occupational Health and Safety (OSH)* • *Regular provision of personnel at the T/Works with Appropriate (PPEs)*	*Existing and Trained Health and Safety Committee*	*WTP Operator Management*	Immediate	*100,000*
						250,000.00

9.4 ESMP during operation of the WTP

At operation stage, the WTP Operator will ensure the following measures are implemented during operation of the WTP.

(i) Ensure at any given time that the Water Use Rights Permits required by Water Resources Authority (WRA) for such facilities are annually renewed and valid.
(ii) The Water Treatment Operators will continuously maintain the sludge drying beds and back wash water system and ensure no blockages
(iii) The Water Treatment Operators will ensure the master meter is functioning and flow measurements are collected on a daily basis.
(iv) WTP Operator Management will continuously promote reforestation programs with company operations
(v) WTP Operator Management will regular inspection of the Water Pipeline wayleave, WTP and FSTP peripheries and ensure the way leave is free from encroachment at market centres.

Table 8 .3 on Page 8-14 presents the ESMP proposed during operation phase of the WTP.

Table 9.3: Environment and Social Management Monitoring Plan during Operation of the WTP Activity Fields	Requirement	Relevant Act (Clauses)	Parameter to be monitored	Continuous Improvement Measure	Responsibility	Timelines	Budget (Ksh)
Approval, Authorization And Permits	WTP Operator should apply for and renew water Abstraction permit for the Augmented Ngolobeleng Water Treatment Plant from WRA, activities under in are listed under the Six Schedule of the Rules.	Water Rules 2007: Part II - Approval, Authorization And Permits	**Validity of Water Use Rights Permits:** Ensuring that the Water Use Rights Permits obtained from the Water Resources Authority (WRA) are valid at any given time. This involves regularly checking the expiration dates of the permits and renewing them as necessary to maintain compliance with regulations.	Ensure at any given time that the Water Use Rights Permits from WRA are valid	*WTP Operator* Management	Annually	Operation funds

Control of Pollution and Water Quality Requirements	**Management of Reagents** For Augmented Ngolobeleng Water Treatment Plant, PDR has provided a well-ventilated and properly lit chemical storage house. Further, personnel handling the reagents will be provided with appropriate PPEs such as gloves, nose masks and goggles to protect them from the chemical. Also procurement of reagents will be done in batches with enough doses to eliminate the risk of some of the reagent expiring therefore requiring disposal.	Water Rules 2007: Part V Water Quality Monitoring And Effluent Discharge	**-Storage Conditions:** Monitoring the conditions of the chemical storage house to ensure it remains well-ventilated and properly lit, as per PDR specifications. **-Personal Protective Equipment (PPE) Usage:** Monitoring whether personnel handling the reagents are consistently wearing appropriate PPEs such as gloves, nose masks, and goggles for their protection. **-Procurement and Inventory Management:** Monitoring the procurement process to ensure reagents are purchased in batches with appropriate doses, minimizing the risk of expiration and the need for disposal. **-Water Quality Compliance:** Ensuring compliance with Water Rules 2007 regarding water quality monitoring and effluent	Continuously maintain the sludge drying beds and back was lagoons / continuously unblock blockages	*WTP Operator* Management	Weekly	Operation funds

			discharge by maintaining the sludge drying beds and backwash lagoons as specified. **-Maintenance Schedule:** Monitoring the frequency and effectiveness of maintenance activities such as unblocking blockages, which should be performed continuously on a weekly basis.				

	Management of Sludge PDR provides for sludge drying beds, the beds provide allow for sludge dewatering and allow for easy handling and evacuation	Water Rules 2007: Part V Water Quality Monitoring And Effluent Discharge	-**Condition of Sludge Drying Beds:** Monitoring the condition of the sludge drying beds to ensure they are functioning properly and allowing for effective sludge dewatering. **-Handling and Evacuation:** Monitoring the handling and evacuation process to ensure it is efficient and complies with safety regulations. **-Compliance with Water Quality Regulations:** Ensuring compliance with Water Rules 2007 regarding water quality monitoring and effluent discharge by maintaining the sludge drying beds and backwash lagoons as specified. **-Maintenance Schedule:** Monitoring the frequency and effectiveness of maintenance activities such as unblocking blockages, which should be	Continuously maintain the sludge drying beds and back was lagoons / continuously unblock blockages	*WTP Operator* Manageme nt	Weekly	Operatio n funds

			performed continuously on a weekly basis. **-Budget Allocation:** Monitoring the allocation of operation funds to ensure adequate resources are available for the continuous maintenance of the sludge drying beds and backwash lagoons. By monitoring these parameters, the management of sludge at the water treatment plant can be effectively controlled, ensuring compliance with regulations and optimal operational efficiency.				

Water Use Charges	A master meter has been installed at the raw water inlet chamber to measure the water abstraction volume for the purpose of calculating amount due for payment of water services to Water Resources Authority (WRA)	PART VIII - Water Use Charges	-**Functionality of Master Meter:** Monitoring the functionality of the master meter installed at the raw water inlet chamber to ensure accurate measurement of water abstraction volume. **-Flow Measurement Collection:** Monitoring the collection of flow measurements from the master meter on a daily basis to track the amount of water abstracted. **-Compliance with Water Use Charges Regulations:** Ensuring compliance with Part VIII - Water Use Charges regulations by accurately measuring water abstraction volume for the purpose of calculating charges payable to the Water Resources Authority (WRA). **-Maintenance and Repair:** Monitoring the need for any maintenance or repair of the master	Ensure the master meter is functioning and flow measurements are collected	*WTP Operator* Management	Daily	Operation funds

			meter to ensure continuous functionality. **-Budget Allocation:** Monitoring the allocation of operation funds to ensure adequate resources are available for maintaining and repairing the master meter as needed. By monitoring these parameters, the water use charges process can be effectively managed, ensuring accurate measurement of water abstraction volume and compliance with regulatory requirements.				

Conservation of Riparian	The Water Rules 2007, Part ix on Conservation of Riparian and Catchment Areas regulation 120.(1) provides that for the purposes of conserving the catchments and riparian areas, the authority may by order or state as a condition on an authorization or permit, require a person to prepare and conform to a Soil and Water Conservation Plan (SWCP). In compliance with this regulation, a forestation program in liaison with Kenya Forest Services (KFS) will be initiated within the WTP and FSTP peripheries. WTP Operator will upscale this initiative after commissioning of the Plant.	PART IX - Conservation Of Riparian And Catchment Areas	-**Implementation of Soil and Water Conservation Plan (SWCP):** Monitoring the implementation of the Soil and Water Conservation Plan (SWCP) as required by the Water Rules 2007, Part IX - Conservation of Riparian and Catchment Areas regulation. This includes ensuring that the reforestation program is carried out in accordance with the plan. **-Collaboration with Kenya Forest Services (KFS):** Monitoring the collaboration and liaison with Kenya Forest Services (KFS) for the implementation of the reforestation program within the peripheries of the Water Treatment Plant (WTP) and Faecal Sludge Treatment Plant (FSTP). **-Upscaling Initiatives:** Monitoring the progress of upscaling initiatives related to	Continuously promote reforestation programs with company operations	*WTP Operator* Management	Annually	Operation funds

			reforestation programs after the commissioning of the Plant. This involves expanding the scope and impact of the reforestation efforts as per the defined plan. **-Annual Assessment:** Conducting an annual assessment of the reforestation programs and their impact on conserving catchments and riparian areas. This assessment should evaluate the effectiveness of the initiatives and identify areas for improvement. **-Budget Allocation:** Monitoring the allocation of operation funds to support the continuous promotion of reforestation programs within company operations. This ensures that adequate resources are available for the implementation and maintenance of these initiatives.				

			By monitoring these parameters, the conservation efforts aimed at preserving riparian and catchment areas can be effectively managed and evaluated for their long-term impact on environmental sustainability.				

9.5 ESMP during Operation of the Faecal Sludge Treatment Facility

The Environmental and Social Management Plan during operation of the Faecal Sludge Treatment facility is presented in **Table 8-5 on Page 8-19**

Table 9.4: Environmental and Social Management Plan during Operation of Faecal Sludge Treatment Facility

Issue	Action required	Parameter to be monitored	Responsibility	Provisional Budget
Odour Menace from Wastewater Treatment Works	• Maintain appropriate covering/ventilation of the pre-treatment unit, appropriate handling and removal of grit/grease • Ensure scum is appropriately disposed-off or properly stabilized and adequate water flow and aeration to reduce the potential of odour formation • The perimeter of the proposed site should be vegetated with trees and plants of varying heights thereby forming windbreaker and reduce dispersion of odour • Repairing of dilapidated the roofs of the sludge drying beds to ensure quick drying of sludge and appropriate disposal to reduce odour emanating from wet sludge.	-Maintenance of Pre-Treatment Unit: Monitoring the appropriate covering and ventilation of the pre-treatment unit to prevent odour emissions. This involves regular inspection and maintenance to ensure the unit functions effectively. -Grit/Grease Handling and Disposal: Monitoring the appropriate handling and removal of grit and grease to prevent odour formation. Proper disposal methods should be followed to mitigate odour risks. -Scum Disposal and Aeration: Monitoring the	MARWASCO	To be established at Operation Phase and included in the operation of the Project

Issue	Action required	Parameter to be monitored	Responsibility	Provisional Budget
		proper disposal or stabilization of scum and ensuring adequate water flow and aeration to reduce the potential for odour formation in wastewater treatment processes. -Vegetation of Perimeter: Monitoring the vegetation of the proposed site perimeter with trees and plants of varying heights to act as windbreakers and reduce the dispersion of odour. This involves regular maintenance of the vegetation to ensure its effectiveness.		
Risks Associated with handling of Sludge at the facility	• Dried sludge could be used to make briquettes as a charcoal substitute or be sold to farmers as fertilizers • Excess sludge can be disposed in a designated landfill which shall only be for disposing dry odourless sludge.	-Utilization of Dried Sludge: Monitoring the process of using dried sludge	MARWASCO	To be established at Operation Phase and included in the operation of the Project

Issue	Action required	Parameter to be monitored	Responsibility	Provisional Budget
	• Preparation and enforcement of operational guidelines for sludge management by Marsabit County Government	to make briquettes as a charcoal substitute. This involves ensuring that the dried sludge meets quality standards for these purposes and that the utilization process is carried out safely and efficiently. -Disposal of Excess Sludge: Monitoring the disposal of excess sludge in a designated landfill intended only for dry, odourless sludge. This includes ensuring that the landfill is properly designated, managed, and operated according to regulatory requirements to prevent environmental contamination. -Preparation and Enforcement of		

Issue	Action required	Parameter to be monitored	Responsibility	Provisional Budget
		Operational Guidelines: Monitoring the preparation and enforcement of operational guidelines for sludge management by the Marsabit County Government. This involves ensuring that comprehensive guidelines are established, communicated, and adhered to by facility operators to mitigate risks associated with sludge handling.		
Solid Wastes Impacts at FSTP Screens	• Develop a comprehensive Waste Management Plan (WMP) for management of solid wastes from screen chambers • Employ personnel who will be in charge of maintaining hygiene and cleanliness of the FSTP including removal of solid wastes from screen chambers • Properly labelled and strategically placed waste disposal containers shall be provided at all places within the FSTP • Solid wastes once removed from screens shall be collected and disposed-off appropriately as required by waste Management Regulations of (2006) and Marsabi County Government by laws.	-Development of Waste Management Plan (WMP): Monitoring the development and implementation of a comprehensive Waste Management Plan (WMP) specifically for managing solid	MARWASCO	To be established at Operation Phase and included in the operation of the Project

Issue	Action required	Parameter to be monitored	Responsibility	Provisional Budget
		wastes from screen chambers at the Faecal Sludge Treatment Plant (FSTP). This involves ensuring that the plan addresses all aspects of solid waste management, including collection, segregation, storage, transportation, and disposal. -Hygiene and Cleanliness Maintenance: Monitoring the employment of personnel responsible for maintaining hygiene and cleanliness at the FSTP, including the regular removal of solid wastes from screen chambers. This involves ensuring that adequate staffing		

Issue	Action required	Parameter to be monitored	Responsibility	Provisional Budget
		levels are maintained and that personnel are properly trained and equipped to perform their duties effectively. -Placement of Waste Disposal Containers: Monitoring the provision of properly labeled and strategically placed waste disposal containers at all locations within the FSTP. This includes ensuring that waste disposal containers are easily accessible, clearly marked, and suitable for the types of solid wastes generated at the facility. -Appropriate Disposal of Solid Wastes: Monitoring the proper collection		

Issue	Action required	Parameter to be monitored	Responsibility	Provisional Budget
		and disposal of solid wastes removed from screens in accordance with waste management regulations, including Waste Management Regulations of 2006 and Marsabit County Government bylaws. This involves ensuring that solid wastes are disposed of appropriately to prevent environmental contamination and public health risks.		
Inversion of Birds and Reptiles to the FSTP	• The sludge treatment facility should be protected from livestock encroachments by providing secure barriers to keep off the animals from interfering with the plant operations and safety • The quality of effluent discharged into the river will be an important parameter on the regional control of the river eutrophication that attracts insects that reptiles feed on	-Protection from Livestock Encroachments: Monitoring the implementation of measures to protect the sludge treatment facility from livestock encroachments. This involves ensuring that	MARWASCO	To be established at Operation Phase and included in the operation of the Project

Issue	Action required	Parameter to be monitored	Responsibility	Provisional Budget
		secure barriers are installed to prevent animals from accessing the facility, thereby minimizing the risk of interference with plant operations and ensuring safety. -Effluent Quality Monitoring: Monitoring the quality of effluent discharged into the river from the facility. This includes regular monitoring of parameters such as nutrient levels, organic matter content, and toxicity to ensure compliance with regulatory standards and minimize the risk of river eutrophication. Maintaining high-quality effluent can help mitigate the attraction of		

Issue	Action required	Parameter to be monitored	Responsibility	Provisional Budget
		insects that reptiles feed on, thereby reducing the likelihood of bird and reptile inversions to the FSTP.		

CHAPTER 10: MONITORING AND TRAINING

The primary objective of environmental monitoring is to ensure the effective implementation of mitigation measures and to address emerging issues of concern. Environmental and social monitoring will enable a timely response to evolving challenges. The Environmental Management Plan (EMP) outlines recommended activities and indicators for monitoring.

Environmental monitoring will ensure that all construction activities adhere to environmental provisions and standards, with a focus on implementing mitigation measures. The contractor will appoint an officer responsible for social and environmental requirements, maintaining regular communication with the proponent's Agricultural Officer and relevant ministries.

Monitoring will span preconstruction, construction, and operation phases, incorporating various activities with specific indicators and assessment criteria.

Monitoring should occur at multiple levels, including on-site monitoring by the Contractor under the supervision of the Consultancy Supervisor. Employing qualified local environmental inspectors is recommended, with part-time involvement of international environmental specialists.

Monitoring activities encompass visual observations, selection of environmental parameters, and regular testing to assess compliance.

10.1 Internal Monitoring

The proponent is responsible for conducting regular internal monitoring to verify Contractor results and audit environmental mitigation measures' direct implementation. Internal monitoring ensures adherence to approval conditions and legal requirements specified in the Environmental Management & Coordination Act (EMCA-1999).

Internal monitoring aims to identify significant environmental hazards and assess existing control systems. The Environmental Section of the proponent will oversee mitigation monitoring during the operation phase.

10.2 Workforce Training

The contractor must ensure all workers undergo induction and regularly monitor occupational health and safety implementation. Client representatives will audit compliance, providing training if necessary.

10.3 External Monitoring and Evaluation

Agricultural extension officers should support on-farm activities, while annual environmental audits, aligned with NEMA requirements, are essential. NEMA oversees project approval and reviews environmental compliance documentation. Detailed Environment Monitoring Plans have been developed, as outlined below:

Table 10-1: Monitoring Plan

Environmental Component	Parameter	Standard	Location	Frequency	Area of Interest/Time	Supervision
Construction Phase						
Noise Levels	Noise levels on dB (A) scale	NEMA guidelines	Construction site and surrounding	As directed by supervision consultant	Peak Day hours	Supervision Consultant/Contractor
Soil Erosion	Turbidity in stormwater	NEMA guidelines	Construction site	During and after rainy seasons	Steep areas	Supervision Consultant/Contractor
Rehabilitation of Work Sites	Progressive rehabilitation monitoring	ESMP	Construction site	As required	Affected areas	Supervision Consultant/Contractor
Accidents/Health	Safety training, accident reports	ESMP	Construction site	Continuous	As needed	Contractor
Health and Safety	Signs, posters, health awareness	ESMP	Construction site	Continuous	As needed	Contractor
Operation Phase						
Conflicts with Downstream	Community cohesion	ESMP	Operation site	Continuous	Affected area	Proponent
Waterborne Diseases	Recorded cases	ESMP	Operation site	Continuous	Affected area/Case by Case	Proponent
Water Pollution	Water Quality Test	ESMP	Operation site	Continuous/Annually	Affected area/Time	Proponent
Soil Erosion	Soil stabilization	ESMP	Operation site	Continuous		Proponent
Accidents	Safety training, accident logs	ESMP	On-farm own record	Continuous	Affected area/Case by Case	Contractor/Proponent

Environmental Component	Parameter	Standard	Location	Frequency	Area of Interest/Time	Supervision
Health and Safety Risks	Recorded cases	ESMP	Operation site	Continuous	Affected area/Case by Case	County Gov't Public Health Officer/Proponent
Waste Generation	Clean, tidy farms and homesteads	ESMP	Operation site	Continuous		County Gov't Env't Officer/Proponent
Social Risks & Spread of STIs	Recorded cases of STIs	ESMP	Operation site	Continuous	Affected area/Case by Case	County Gov't Public Health Officer/Proponent
Decommissioning Phase						
Rehabilitation of Project Site	Vegetation	ESMP	Site	End of Project Life	On-site	Contractor/Proponent
Noise Pollution	Noise levels on dB (A) scale	NEMA guidelines	Decommissioning site and surrounding	End of Project Life	On-site	Contractor/Proponent
Dust Emissions	Visual inspection	ESMP	Decommissioning site	End of Project Life	On-site	Contractor/Proponent
Occupational Health and Safety Hazards	Visual inspection	ESMP	Decommissioning site	End of Project Life	Case by Case	Contractor/Proponent

This monitoring plan ensures comprehensive oversight of environmental and social aspects throughout the project lifecycle, promoting sustainability and compliance with regulatory standards.

CHAPTER 11: CONCLUSION AND RECOMMENDATIONS

11.1 Conclusion

The integration of environmental concerns in the implementation strategy of the project will enhance environmental practices amongst all stakeholders. This will ultimately enhance the sustainable development of projects in Loiyangalani Town . The ESIA Study Report concludes that development of the Long Term Action Plans for the Water and Sanitation Program should be undertaken and makes the following key recommendations: -

1. The Water and Sanitation project should be undertaken since it will enhance the living standards of the residents of Loiyangalani Town especially the poor who have suffered due to persistence non availability of safe portable water and waste water disposal.
2. The lack of water has hindered development of economic activities in the town.
3. The implementation of the project will improve public health through provision of good quality water and safe disposal of waste water.
4. Employment opportunities will be created in this area during both construction and operation phase
5. The major benefits to be expected from the project implementation far out-weigh the adverse impacts. Environmental impacts occur mainly in the construction phase. These are temporal and mitigation measures are outlined in the Environmental Management Plan.
6. An Environmental Monitoring Plan will be put in operation to regularly monitor the operation of the FSTP.
7. Overall air quality will be enhanced as bad odours will be eliminated in the township and only localized at the Faecal sludge treatment plant.
8. This will boost the performance and service delivery of the Water Service Provider.

11.2 Recommendation

The ESIA makes below listed provisions:

- The Environment and Social Management Plan (ESMP) prepared under this ESIA assessment recommends provision of a budget of Kenya Shillings Two Million, Eight Hundred and Fifty Thousand (Kshs 2,850,000) for mitigation of environment and social impacts identified in this Report. The Bid Documents to be prepared for the project should incorporates the Environment, Social provisions discussed herein (Environment and Social Impact Assessment and Mitigation Measures).
- From the screening assessment, the project components discussed in this report will not trigger land acquisition and therefore not RAP was prepared. This is because road reserves and wayleaves are free from encroachment and are wide enough to accommodate water the proposed project components. Further, Land in Loiyangalani is majorly community land, therefore the project proponent and land owners will sign voluntary land donation forms appended to this ESIA as appendix 6.
- Project Contract Document to include provisions for the Contractor for preparing and implementing Construction Environment and Social Management Plan (C-EMSP), annexes to the C-EMSP will include but not limited to: Soil and Sedimentation Control Plan, Spoil Management Control Plan, Dust Management Plan, Health, Hygiene and Safety Plan, Labour Management Plan, Child Protection Strategy, Gender-based Violence Action Plan, Waste Management Plan, Contractors Code of Conduct, Gender Inclusivity Strategy , HIV/Aid Prevention Strategy. The contractors will be required to engage services of a qualified Environment, Health and Safety Officers and Social Safeguards Officer at the time of Project implementation.

- At Project implementation stage, the contractor with approval of the supervising engineer will prepare periodic Environmental and Social Implementation Report. The reports will provide status of implementation of risks & impacts management measures to date from the project start to the end of the reporting period. From an occupational Health and Safety approach, the contractors will ensure they undergo the following; (OSH) risk assessment, Registration of workplaces, Safety and Health (OSH) Audit, Fitness to work assessment of employees, Training of all workers or workers' representatives in basic Occupational Safety and Health, Accident and incident reporting, Compensation of injured workers who die or get injured and disabled and Examination of Safety Plants and Equipment
- Annual environmental audits should be carried out on the project to ensure compliance of the project with the mitigation measures outlined in the Environmental and Social Management Plan (ESMP). To ensure that the impact on the environment can be completely minimized, a monitoring and training activity should be carried out as outlined in the report.
- At Project completion stage, within the Defects Liability Period, Marsabit Water and Sanitation Company will initiate an Initial Environment and Social Audit for the Project as required by EIA/EA Audit Regulations of the year 2003 and subsequent annual self-audits. The Audit will develop an Environment and Social Audit Action Plan (ESAAP) that will be used to track Project Environment and Social Compliance during Project implementation stage.

CHAPTER 12: REFERENCES

1. County Government of Taita Taveta, County Integrated Development Plan 2018-2022.
2. GoK 1999: Sessional Paper No.3 of 1999 on National Poverty Eradication Plan 1999:2015. Government Printers, Nairobi
3. GoK 2003: The Environmental (Impact Assessment and Audit) Regulations. Kenya Gazette Supplement No. 75 of 14th Sep 2003
4. GoK 2009: National Environment Action Plan Framework 2009-2013.
5. GoK 2016: Water Act Laws of Kenya.
6. GoK 2012; County Government Act, Laws of Kenya
7. GoK 2012; Physical Planning Act Cap 286, Laws of Kenya.
8. GoK 2015: Environmental Management and Coordination Act, 1999 (EMCA) Amended 2015
9. African Development Bank Environmental and Social Safeguards Operating Safeguards 2023.
10. NEMA (National Environment Management Authority) (2006). Environmental Management and Coordination (waste Management) Regulations. Nairobi: Government printer.
11. NEMA (National Environment Management Authority) (2006). The Environmental Management and Coordination (Water Quality) Regulations. Nairobi: Government printer.
12. NEMA (National Environment Management Authority) (2009). Environmental Management and Coordination (Noise and Excessive Vibrations Pollution) (Control) Regulations. Nairobi: Government printer.
13. National Water Master Plan 2030
14. Water Resources Management Rules, 2007.

APPENDIXES

Appendix 1 Environment and Social Screening Checklist
Appendix 2 Minutes of Public Participation
Appendix 3 Marsabit County Water Services Management
Appendix 4 Health and Sanitation Campaign Strategy
Appendix 5: Land donation forms
Appendix 6 Stake holder Engagement plan
Appendix 7 Pollution prevention plan
Appendix 8 waste management plan

APPENDIX 1 ENVIRONMENTAL AND SOCIAL SCREENING CHECKLIST

SECTION A: ENVIRONMENTAL ISSUES

Will the sub-project:	Yes	No
Create a risk of increased soil erosion?	☒	☐
Create a risk of increased deforestation?	☐	☒
Create a risk of increasing any other soil degradation	☒	☐
Affect soil salinity and alkalinity?	☐	☒
Divert the water resource from its natural course/location?	☐	☒
Cause pollution of aquatic ecosystems by sedimentation and agro-chemicals, oil spillage, effluents, etc.?	☒	☐
Introduce exotic plants or animals?	☐	☒
Involve drainage of wetlands or other permanently flooded areas?	☐	☒
Cause poor water drainage and increase the risk of water-related diseases such as malaria?	☒	☐
Reduce the quantity of water for the downstream users?	☐	☒
Result in the lowering of groundwater level or depletion of groundwater?	☐	☒
Create waste that could adversely affect local soils, vegetation, rivers and streams or groundwater?	☒	☐
Reduce various types of livestock production?	☐	☒
Affect any watershed	☒	☐
Focus on biomass/bio-fuel energy generation?	☐	☒

SECTION C: SOCIO-ECONOMIC ISSUES

Will the sub-project:	Yes	No
Displace people from their current settlement?	☐	☒
Will the Project lead to forced evictions and displacement	☐	☒
Infringe on Human Rights Principles	☐	☒
Interfere with the normal health and safety of the worker/employee?	☒	☐
Reduce the employment opportunities for the surrounding communities?	☒	☐
Reduce settlement (no further area allocated to settlements)?	☐	☒
Reduce income for the local communities?	☐	☒
Increase insecurity due to introduction of the project?	☐	☒
Increase exposure of the community to communicable diseases such as HIV/AIDS?	☒	☐
Induce conflict?	☒	☐
Have machinery and/or equipment installed for value addition?	☐	☒
Introduce new practices and habits?	☐	☒
Lead to child delinquency (school drop-outs, child abuse, child labour, etc.?	☐	☒
Infringe on provision of ILO on labour and working conditions		
Lead to gender disparity?	☒	☐
Lead to poor diets?	☐	☒
Lead to social evils (drug abuse, excessive alcohol consumption, crime, etc.)?	☐	☒

Section D: Natural Habitats

Will the sub-project:	Yes	No
Be located within or near environmentally sensitive areas (e.g. intact natural forests, mangroves, wetlands) or threatened species?	☐	☒
Adversely affect environmentally sensitive areas or critical habitats – wetlands, woodlots, natural forests, rivers, protected areas including national parks, reserves or local sanctuaries, etc.)?	☐	☒
Affect the indigenous biodiversity (flora and fauna)?	☐	☒
Cause any loss or degradation of any natural habitats, either directly (through project works) or indirectly?	☒	☐
Affect the aesthetic quality of the landscape?		☒
Reduce people's access to the pasture, water, public services or other resources that they depend on?	☐	☒
Increase human-wildlife conflicts?	☐	☒
Use irrigation system in its implementation? *NB:If the answers to any of the above is 'yes', please include an ESMP with sub-project application.*	☐	☒

If the answer to the above is 'yes', please consult the ESMF that has been prepared for the project.

SECTION E: Pesticides and Agriculture Chemicals

Will the sub-project:	Yes	No
Involve the use of pesticides or other agricultural chemicals, or increase existing use?	☐	☒
Cause contamination of watercourses by chemicals and pesticides?	☐	☒
Cause contamination of soil by agrochemicals and pesticides?	☐	☒
Experience effluent and/or emissions discharge?	☐	☒
Export produce? Involve annual inspections of the producers and unannounced inspections?	☐	☒
Require scheduled chemical applications?	☐	☒
Require chemical application even to areas distant away from the focus?	☐	☒
Require chemical application to be done by vulnerable group (pregnant mothers, chemically allergic persons, elderly, etc.)?	☐	☒

Section F: Vulnerable and Marginalized Groups meeting requirements for OP 4.10

Are there:	Yes	No
People who meet requirements for OP 4.10 living within the boundaries of, or near the project?	☐	☒
Members of these VMGs in the area who could benefit from the project?	☐	☒
VMGs livelihoods to be affected by the subproject?	☐	☒

If the answer to any of the above is 'yes', please consult the VMGF that has been prepared for the project.

Section G: Land Acquisition and Access to Resources

Will the sub-project:	Yes	No
Require that land (public or private) be acquired (temporarily or permanently) for its development?	☒	☐
Use land that is currently occupied or regularly used for productive purposes (e.g. business enterprises, gardening, farming, pasture, fishing locations, forests)	☒	☐
Displace individuals, families or businesses?	☒	☐
Result in temporary or permanent loss of crops, fruit trees and pasture land?	☒	☐
Adversely affect small communal cultural property such as funeral and burial sites, or sacred groves?	☐	☒
Result in involuntary restriction of access by people to legally designated parks and protected areas?	☐	☒
Be on monoculture cropping?	☐	☒

If the answer to any of the above is 'yes', please consult the mitigation measures in the ESMF, and if needed prepare a (Resettlement Action Plan) RAP.

Section H: Proposed action

(i) Summarize the above:	**(ii) Guidance**
☐ All the above answers are 'No' ☒ There is at least one 'Yes'	• If all the above answers are 'No', there is no need for further action; • If there is at least one 'Yes', please describe your recommended course of action (see below).

(iii) Recommended Course of Action

If there is at least one 'Yes', which course of action do you recommend?

☒ The Environment and Social Specialist will provide detailed guidance on mitigation measures as outlined in the ESIA Report; and
☒ Specific advice is required from the Environment and Social Specialist and the technical team regarding sub-project specific EIA(s) and also in the following area(s)

[type here]

☒ All sub-project applications/proposals MUST include a completed Environment and Social Screening checklist. The Environment and Social Specialist will review the sub-project proposals and sign off;

☒ The proposals will then be submitted to the Project Technical Committee for clearance for implementation by communities in the proposed subprojects.
Expert Advice

☒ The National Government through the Department of Monuments and Sites of the National Museums of Kenya can assist in identifying and, mapping of monuments and archaeological sites; and

☒ Sub-project specific EIAs, if recommended, must be carried out by experts registered with NEMA and be followed by monitoring and review. During the process of conducting an EIA the proponent shall seek views of persons who may be affected by the sub-project. The WB policy set out in OP 4.01 requires consultation of sub-project affected groups and disclosure of EIA's conclusions. In seeking views of the public after the approval of the sub-project, the proponent shall avail the draft EIA report at a public place accessible to project-affected groups and local NGOs/CSOs.

Completed by:

Name: Godwin Lidahuli Sakwa NEMA Lead Expert 2492

Position / Community: Environment Social Specialist

Date:	15th April 2021

Field Appraisal Officer

Signature: 

Date:	[type here]

Note:

Project category	**Characteristics**
A	Full and extensive ESIA needed- irreversible environmental impacts; impacts not easy to pick or isolate and mitigation cost expensive; ESMP design not easily done; Must have the EIA done and future annual EAs instituted
B	Site specific environmental impacts envisaged; mitigation measures easy to pick, not costly and ESMP design readily done; need an ESIA and future EAs
C	Have minimal or occasionally NO adverse environmental impacts; exempted from further environmental processes save environmental audits

APPENDIX 2: MINUTES OF PUBLIC PARTICIPATION

MINUTES OF THE CONSULTATIVE MEETING HELD ON 21/02/ 2024

TANA WATER WORKS DEVELOPMENT AGENCY

CONSULTANCY SERVICES FOR DETAILED DESIGN OF LOYAINGALANI TOWN WATER SUPPLY AND SANITATION PROJECT

MINUTES OF STAKEHOLDERS ENGAGEMENT MEETING HELD ON WEDNESDAY, 21ST FEBRUARY 2024 AT PALM SHADE HOTEL, LOIYANGALANI TOWN

TIME: 10.21 A.M.

ATTENDANCE

S. NO	NAMES	DESIGNATION
1.	Geoffrey Mutuku	Assistant County Commissioner **(Meeting Chair)**
2.	Mathew Lechipan	County Administrator
3.	Lydia Lenkarite	Ward Administrator
4.	John Orbora	Chief
5.	Patrick Lesas	Assistant Chief
6.	Teresa Lopowa Etapar	Mca Office Representative
7.	Richard Maina	Land Committee
8.	Suleiman Isaac	Land Committee
9.	Dair Lentipan	Loiyangalani Water Users Association Secretary
10.	Ekal Nachodo	Council Of Elders
11.	Samuel Lolesen Epeot	Council Of Elders
12.	Lochilia Nyangayo	Council Of Elders
13.	Lkotikal Orbora	Council Of Elders
14.	Lmogwar Orre	Council Of Elders
15.	Tobias Lenguro	Health Care Worker
16.	David Loburjilai	People With Disability Representative
17.	John Esekon	Pastor
18.	Hassan Mohamed	Sheikh
19.	Fatuma Kimogol	Business Enterprises Representative

S. NO	NAMES	DESIGNATION
20.	Jacob Lepalat	Notetaker
21.	Samson Lokutuni Ekiru	Youth Representative
22.	Lengosira Andy	Elmolo Community Representative
23.	Rosa Mirkalkona	Youth Representative
24.	Singilan Lepalo	Elmolo Community Representative
25.	Talaso Lepalat	Kiwanja Village Representative
26.	Charles Lekenit	Soweto Village Representative
27.	Ntoto Mirkalkona	Rendile Community Representative
28.	Loreo Napaja	Kilimambogo Village Representative
29.	Sebastian Leborkwe	St Martin Village Representative
30.	Paul Ereng	Kulamawe Village Representative
31.	Eng. Teresa Mbogo	Engineer – Kiri Consult Limited

AGENDA

1. Introduction.
2. Presentation of the project's components
3. Land Requirements and Voluntary Donation
4. Matters Arising from the presentation
5. Site visit
6. Signing of the Voluntary Land Donation Forms
7. Any Other Business (A.O.B.)

MINUTES OF MEETING

Minute No.	Discussions / Deliberations	Action By
1	**INTRODUCTION** The meeting was called to order by the Meeting Chair at 10.21 A.M. A word of prayer was led by Mr Hassan Mohamed, followed by self-introductions.	

Minute No.	Discussions / Deliberations	Action By
	The Meeting Chair welcomed all the members present to give ideas on the project's implementation. He also mentioned that the meeting was strictly meant for the Loiyangalani water supply and sanitation project. The Chief also emphasized and explained to the community representatives the importance of the project since it will be long-term and sustainable.	
2	**PRESENTATION OF THE PROJECT'S COMPONENTS** In collaboration with the Northern Water Works Development Agency, the participants were informed that Tana Water Works Development Agency intends to execute the Loiyangalani town water supply and sanitation project to improve water supply and sanitation services in Loiyangalani town. The Program Executing Agency (P.E.A.) is the Tana Water Works Development Agency (TWWDA), which is a state corporation under the Ministry of Water & Sanitation and Irrigation. The participants were given printed copies of the project maps and descriptions of each project component. Further, each element of the project was verbally described in detail to ensure the participants understood the coverage and intention. A copy of the presentation's brief is attached.	
3.	**LAND REQUIREMENTS AND VOLUNTARY DONATION** The participants were informed that for the project to start, it requires land for the various components, including but not limited to: • Water treatment facilities (will be on communal grazing land) • Boreholes (will be at communal grazing land) • Gravity Transmission Main Pipeline (will transverse communal grazing land) • Storage Tanks (to be at the water treatment plant site) • Distribution Network (these will be on road reserve) • Komote Village reverse osmosis water treatment units • Faecal Sludge Treatment Plant (will transverse communal grazing land) • Ablution blocks at specified public locations (schools, market places	Community Leaders

Minute No.	Discussions / Deliberations	Action By
	etc) After intensive discussions on the project and its sustainability by the various representatives, they finally decided to willingly donate the land for the above project since it would benefit the entire Loiyangalani community and its jurisdiction. They affirmed that they are giving their land voluntarily to serve the intention of the project specifically, and they can withdraw anytime if the purpose is not implemented.	
4.	**MATTERS ARISING FROM THE PRESENTATION** **1) Water Treatment Units for Komote Village** The participants were informed that the project also proposed purchasing some reverse Osmosis Units for water treatment for the residents of Komote Island (El-molo Bay). The meeting was told that the community requires consent on the project's implementation, including confirmation of the availability of land for setting up the treatment units, which was specified as half an acre. The El-Molo Bay representatives informed the meeting that the community will require assurance that the county government will maintain the treatment units in good working condition after the establishment and completion of the project. The Bay's representative also informed the meeting that there is an ongoing reverse osmosis project currently in Elmolo, and they are worried about duplication of projects in the same area. After discussing the issue with the members and hearing their suggestions, they decided that the Elmolo community requires additional treatment units, and the site for the osmosis unit was to be communicated as early as possible upon identification. **2) Ablution Blocks** It was noted that the issue of hygiene and cleanliness in Loiyangalani Town needed collective responsibility from all town dwellers. There is a need to campaign and sensitize the community members on the importance of	KCL Community Leaders County Government

Minute No.	Discussions / Deliberations	Action By
	cleanliness and proper disposal of faecal matter and waste to prevent outbreaks of diseases like cholera and typhoid, especially during the rainy season. The community's representatives were happy to hear that ablution blocks will be provided in public places. They affirmed their willingness to donate land for the public ablution blocks wherever the project proposed to locate them. They requested that all public institutions be given priority on water distributions and ablution blocks, including schools, health facilities, polytechnic facilities, police stations, slaughterhouses, and any other institutions. They proposed that the ablution blocks be constructed to be flushable toilets with proper lighting systems as this will reduce the filling up of the toilets. **3) Community Expectations** The Community representatives listed their expectations upon commencement and completion of the project as follows: • Clean and sufficient water for human consumption • Reduction of waterborne diseases • Bigger population benefits and access to water easily • Standardized faecal disposal system • Better infrastructure(roads, schools, markets) • Proper piping(quality pipes) to prevent breakages and leakages **4) Other Clarifications** • The meeting was informed that cattle troughs will be provided through this project. • They were also informed that the County Government of Marsabit will operate and maintain the water and sanitation facilities. • They were informed that the financing model for the Operation and Maintenance phase will depend on the financing model for the project's construction.	
5.	**SITE VISITING**	Community

Minute No.	Discussions / Deliberations	Action By
	The Community representatives and the government officials present visited and evaluated the land requested for donation.	Leaders
6.	**SIGNING OF THE VOLUNTARY LAND DONATION FORMS** The Voluntary Land Donation Forms were presented to the meeting participants. They were read in English and interpreted in local languages. They were informed that as a confirmation of the community's commitment, the community leaders would have to sign the Voluntary Land Donation Forms. Therefore the leaders signed the forms as attached.	Community Leaders
7	**ANY OTHER BUSINESS (A.O.B.)** There being no other business to be discussed, the meeting adjourned with a word of prayer from Mr David Loburjilai.	

Minutes Prepared By: _____ Date: 21/2/2024

(Patrick Lesas, Assistant Chief, Gus Sub-Location)

Minutes Confirmed By 1: _____ Date: 21/2/2024

(Suleiman Isack, Council of Elders representative, Loiyangalani Town)

Minutes Confirmed By 2: _____ Date: 21/02/2024

(John Orbora, Chief, Loiyangalani Location)

Minutes Approved By: _____ Date: 21/02/2024

(Geoffrey Mutuku, Assistant County Commissioner, Loiyangalani)

KIRICONSULT

ATTENDANCE LIST FOR THE CONSULTATIVE MEETING HELD ON 22/02/2024 AT PALM RESORT LOIYANGALANI

Client / Employer:
TANA WATER WORKS DEVELOPMENT AGENCY

KIRICONSULT
Consultant:
KIRI CONSULT LIMITED

LOIYANGALANI TOWN WATER SUPPLY AND SANITATION PROJECT

ATTENDANCE LIST - STAKEHOLDERS ENGANGEMENT MEETING HELD ON .....

S. No	Full names	Designation	National ID number and/or phone number	Signature
1	JACOB LTOONGINA LEPALAT	Notetaker	40346946 0713460396	
2	SAMSON LOKUTUNI EKIRU	YOUTH REP.	35365572 0740946305	
3	LENGOSIRA ANDY	EL-MOLO COMMUNITY REP	0725887717 0632119	
4	Rosa mirkalkona	Naagan Community Youth	0790007805 33631042	
5	SEBASTIAN LEBORKWE	Ward plan. Com. CHAIRMAN	0714877843 0061803	
6	SINGILAN LEPALO	ELMOLO REP	11503507 0710236622	
7	TALASO LEPALAT	KIWANJA COMMUNITY REP	23788635 0714577277	

Client / Employer:
TANA WATER WORKS DEVELOPMENT AGENCY

KIRICONSULT
Consultant:
KIRI CONSULT LIMITED

LOIYANGALANI TOWN WATER SUPPLY AND SANITATION PROJECT

ATTENDANCE LIST - STAKEHOLDERS ENGANGEMENT MEETING HELD ON .....

8	HKOTIKAL ORBORA	KIWANJA REP	0635566	
9	CHARLES L. LOKENYII	SOMETO RB	16016292	
10	JOHN ESEKON	PASTOR	13425240	
11	DAVID LOBURETICAN	PWS	0631758	
12	HASSAN MOHAMED	IMAAM	23876276	
13	FATUMA KIMOGEL	BLS WEES	0061807	
14	RICHARD MAINA	LAND COMMITTEE MINORITY LEADER	0810128	
15	DAIRLENTIPAN	Loiyangalani Water Users Association Secretary	23788526 0705926610	
16	EKAL NASHODO	ELDER	12758724 0724228191	

Client / Employer:
TANA WATER WORKS DEVELOPMENT AGENCY

KIRICONSULT

Consultant:
KIRI CONSULT LIMITED

LOIYANGALANI TOWN WATER SUPPLY AND SANITATION PROJECT

ATTENDANCE LIST - STAKEHOLDERS ENGANGEMENT MEETING HELD ON .....

17	TOBIAS. C. LENG'URO	Health Care Worker	23552499 0720464519	
18	NTOTO KALATONI LEMYAKAKONA	RENDILLE REP.	0793787793 11503392	
19	Samuel Lolesen Epeet	Council of Elders Rep (Turkana)	0710192713 7870285	
20	Lochwia Nyamgajo	Elder	0741206957	
21	Eriberam Isaac	Land Committee	9220502 0712975600	
22	Paul Ekong	WRUA MEMBER	25988726 0718221433	
23	JOHN ORBORA	CHIEF	24605594	
24	Lmwogwar Orre	KIWCHUA	8205893	
25	TERESA LOPOLIA EMARAK	MCA OFFICE	3231929 1	

Client / Employer:
TANA WATER WORKS DEVELOPMENT AGENCY

KIRICONSULT

Consultant:
KIRI CONSULT LIMITED

LOIYANGALANI TOWN WATER SUPPLY AND SANITATION PROJECT

ATTENDANCE LIST - STAKEHOLDERS ENGANGEMENT MEETING HELD ON .....

26	LYDIA H. LEMKARIAK	WARD ADMINISTRATOR	0045535	
27.	MATHEW LECHIPANI	D/SCB - COUNTY Admin	4396436	
28	GEOFFREY MUTUKU	ASSISTANT COUNTY COMMISSIONER	23538945	
29.	PATRICK LEKAAS	A/chief	11186347	
30.	Loreo Napaja	Community Rep Kalimanaro	38286163	

PHOTOS OF CONSULTATIVE MEETING HELD ON 22/02/ 2024

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT FOR LOYANGALANI TOWN WATER SUPPLY AND SANITATION PROJECT.

MINUTES OF PUBLIC PARTICIPATION FORUM HELD ON THE 23RD JUNE 2022 At THE CHIEF'S OFFICE HALL FOR LOYANGALANANI LOCATION

PRESENT:

Consultant Représentative		
Collins Juma		Environmentalist
Resident of LoIyangalani Location - see attached SIGNED list		

KEY PROJECT DATA

Client/Employer	Northern Water Works Development Agency and Tana Water Works Development Agency (TWDA)

MINUTES

Item	Minutes	Action By
1.	**Introduction** The meeting was called to order by the Assistant Chief at 10am, he then invited an elder who welcomed all those in attendance and thereafter offered an opening prayer. In his opening remarks, the area assistant chief congratulated all the villagers and leaders who had set aside some time to attend the meeting. He informed them that the meeting was about improvement of water supply and sanitation within Loyangalani in order to reduce the risk of water borne diseases outbreak and other issues associated with water scarcity including time wasting, while fetching the water from long distances and water wasting due to lack of storage. The chief also appreciated those that attended, he encouraged them to make a habit of attending public participation forums organised within the area since it was a good way of participating in project planning. Residents were urged to cooperate with the consultant, be attentive and ask all questions and seek clarifications about the proposed Water and Sanitation Project. Those in attendance were further informed that the project will have other benefits like creation of employment for youth and women during implementation. The chief then invited the consultant's representative to take over and go through the meeting's agenda	Assistant Chief Loyangalani Sub location
2.	**Project Information** The consultant informed residents that the project will entail rehabilitation and constriction of the water treatment plant at ngobeleng springs and a storage water tank which will increase water supply in a day. There will also be rehabilitation and construction of new water storage tanks in town, rehabilitation and laying of new transmission water pipelines and construction of additional water kiosks. On the side of sanitation, the proposal was that: consultant recommends development of sanitation facilities and infrastructure for management of liquid wastes and sludge at the following levels: • Residential properties – both privately owned and rented accommodation. • Institutional buildings – such as schools, hospitals and health facilities.	Environmentalist

Item	Minutes	Action By
	• Public places – including shops, restaurants, bus stations, markets etc., and • Commercial premises – factories and other places of work. Once the project is Complete it will be handed over to the community to select groups or individuals to manage them.	
3.	**Environment and Social Safeguard Report** The consultant environmentalist representative Mr Collins Juma informed the meeting that they were going to prepare *Environmental and Social Impact Assessment Report* (ESIA) that will capture all the environmental and social impacts of the project and provide mitigation measures. They were assured that all their opinions and concerns will be captured in the report so as to ensure the Project is acceptable by the community and also sustainable development is achieved.	Environmentalist
4.	**Project Positive Impacts** Mr Collins pointed out to the meeting that the water supply project has enormous benefits as summarized below. a) Improvement of sanitation within the area by providing clean reliable domestic water this will go a long way in reducing water borne ailments such as cholera Typhoid and Diarrhoea. Respiratory ailments like Covid 19 can also be controlled through regular hand wash with soap and water. b) Reduced time taken for residents while fetching water. This valuable time can be used to do other economic activities like fishing and small-scale businesses. c) Availability of clean reliable domestic water will also reduce cases of gender-based Violence towards women and children in their quest to search of water in far flanked areas. d) Improve the value of land through provision of sanitation infrastructure, better housing will be developed in the area. e) The Project will provide employment opportunities, at construction stage opportunities will be direct employment for both skilled and unskilled labour while during operation phase, employment opportunities will be available for sewer operators.	Environmentalist
5.	**Impacts to Environment (Natural and Social)** The environmentalist informed the meeting that this being water supply project, it will have minimal negative impacts likely to be triggered by the Project. Some of the impacts are as indicated below. • Over abstraction of water should be avoided so that other users are not affected. • Noise and Excessive Vibrations. This is likely to result during the construction phase from the equipment involved in the Project. He further added that all these impacts would be addressed comprehensively by the ESIA study report and appropriate mitigation measure provided.	Environmentalist
6.	**Question and Answer Session**	

<table>
<tr><th>Item</th><th>Minutes</th><th>Action By</th></tr>
<tr><td></td><td>
After discussion summarized above, the were invited to a question and answer session under the guidance of the chief. Detailed questions and suggestion of the plenary session are presented in Table 1 below

Table 1: Plenary Session
<table>
<tr><th>Suggestion / Question</th><th>Response</th></tr>
<tr><td>Stakeholders wanted to know if at all water will be available this time since pipes were laid previously by other projects but water has never flowed.</td><td>The meeting was informed that this time the project design has been done properly which includes expansion of treatment plant to treat water from the source that is ngobeleng springs. An additional water storage tank would be erected at the source and another erected in the town to supplement usage. This additional volume will ensure water is available to all residents within the project area.</td></tr>
<tr><td>Residents wanted to know if there will be household connections done under the project.</td><td>The meeting was informed that the aim of the Government is to bring services closer to the people. The water line will be brought as close as possible to residents however, residents will be expected to apply through their water council.
The county government of Marsabit should also come on board and ensure distribution lines are extended progressively to residents who will be far away from the main line.
It was also agreed that residents can be pooled together into villages and a T- Junction provided to supply them with water.</td></tr>
<tr><td>They wanted to know how the abolition blocks would be places and shared among the community</td><td>Majority of the villagers in attendance preferred pit latrines to the conventional flashing toilets due to mostly maintenance costs and the issue of water scarcity in the area. They further suggested that each plot should have its own pit latrine with water also brought near to them.</td></tr>
<tr><td>A concern was raised about drawing too much water from the ngobeleng springs</td><td>It was suggested that the source be fenced but a gate made for the villagers to be able to bring their animals to drink water.
A tree planting initiative was also suggested as an alternative to guard the water source.</td></tr>
<tr><td>Residents also wanted to be informed about what can be done to protect their natural springs that are being destroyed by private developers.</td><td>Stakeholders were assured that a borehole would be drilled so as to try and conserve the water from Maji Moto, Nagan and Kiwanja Springs.
The chief also suggested an untapped source called Mowolkiteng source which had great potentials.</td></tr>
<tr><td>Residents wanted to know if the contractor will source for workforce within the community where the works will be implemented.</td><td>Residents were informed that all unskilled labour and some skilled will be sourced from the local community. Youths were encouraged to organize themselves into groups and avail themselves for consideration.
In addition, the resident engineer informed residents that they will come up with designs for water kiosks and allow local masonries to construct them under supervision from the</td></tr>
</table>
</td><td>Environmentalist</td></tr>
</table>

Item	Minutes	Action By
	resident Engineer. This will go along way in ensuring that 70% of labour is provided locally.	
7.	**Closing Remarks** A vote of thanks was given by an Elder in attendance who reiterated that residents were in support of the project since water scarcity was a big problem in the area. He urged all those tasked with project implementation not to fail and stall the project as witnessed in other government projects. The area assistant chief urged the stakeholders to embrace the project because it was a socially uplifting project. He encouraged them to approach his office in case they have any queries or complains about the project. There being no any other business the meeting adjourned at 5.30 PM with a word of prayer from the pastor.	Assistant Chief

Minutes Prepared by:

Collins Juma.

Environment Consultant

SAMPLE PHOTOS OF THE MEETING

The consultant's representative addressing the villagers

The area assistant Chief addressing the stakeholders.

Stakeholders following keenly the meeting

An elder raising concerns

ATTENDANCE LIST- LOYANGALANI LOCATION

TANA WATER WORKS DEVELOPMENT AGENCY

CONSULTANCY SERVICES FOR DETAILED DESIGN OF LOYAINGALANI TOWN WATER SUPPLY AND SANITATION PROJECT.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PUBLIC PARTICIPATION LIST

Venue: Chiefs Office Hall   Date: 23/06/22

No	Name	Phone	Village/Designation	Sign
1	Jackson Ekadeli Edung	0742468081	Kilimambogo	
2	MAMbosa Mirkhalkona	0710627184	Naagolian	
3	Naramatu Lepakeli	0795413058	Soweto	
4	Vivian Chubin	0792063640	Kulasamaki	
5	Ntoto Kalaton.	0793787798	Naagolian	
6	Kamoi Ogomaa	0716116920	Kiwanja	
7	Lmogwara Lepalala	0790243267		
8	Joyce Lokai	0728115881	Kulamawe	
9	SUSAN EPEYOM	0759793405	Kula mawe	
10	Ayanae LOMWAR	0740383962	NAGANIA	
11	AROT TONGOLOMOE	0115451860	KULAMAWE	
12	LOYIKE LOCHUKURI	0792145861	KULA SAMAKI	
13	LOKWANG ARDAPASH		Kilimambogo	
14	Christina	0768907376	Soweto	
15	Etapar Lochili.	0758278859	Kilimambogo	
16	Edung Mzee Tune	0742468081	dikdik Kimat	

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TANA WATER WORKS DEVELOPMENT AGENCY

CONSULTANCY SERVICES FOR DETAILED DESIGN OF LOYAINGALANI TOWN WATER SUPPLY AND SANITATION PROJECT.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PUBLIC PARTICIPATION LIST

Venue: Chiefs Offic Hall   Date: 23/06/22

No	Name	Phone	Village/Designation	Sign
17	Emmanuel Kaina Kgusa.	0718405693	Kiwanja	
18	SONBE LOWA	0743877070	KULAPESA	
19	SULEMAN ISSACK	0712975600	KULAPESA	
20	Lokatukoi Ewongang	0742116135	Namoitorong	
21	ndura lenguyago	0708967364	St. martin	
22	langa, mark Lourogon	0768009713	Soweto	
23	Lochilia Nyangayo	0713758151	dikilikimat	
24	FRANCIS LOPAE ERUS	0700713665	Kula Mawe	
25	PAUL AMULIA	0792148683	Kula Mawe	
26	Alayokot Nachika	0114376155	Kulamawe	
27	Lodoudekei Longori	0768134442	dikilikimat	
28	Amina Hussein	0712914481	Town centre	
29	Peter daka	0794647553	Kilimambogo	
30	Ediman Eyole	0740896789	Nachukula	
31	MPIPI Eyapan	0706441361	Kulapesa	
32	Longodei Nakoreb	0729617849	Kilimambogo	

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TANA WATER WORKS DEVELOPMENT AGENCY

CONSULTANCY SERVICES FOR DETAILED DESIGN OF LOYAINGALANI TOWN WATER SUPPLY AND SANITATION PROJECT.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PUBLIC PARTICIPATION LIST

Venue: Chiefs Office Hall Date: 20/05/22

No	Name	Phone	Village/Designation	Sign
33	Asekon Kamboka Losikiria	0718572715	Nachukule	
34	Margaret Nkomilas Paulo	0794624670	Kulapesa	
35	Ngichi Namuni	0746287448	Likilikimat	
36	Josfi Lorot	0758279096	Achukule	
37	Lepalo Lochuk Joseph	0720 064 920	ST-MARTIN	
38	Scholastika Akono	070293658 4	Kula Samaki	
39	Lolengon Ekaran	0720511181	Nawoitorong	
40	Akodo Sorot	0746465143	Nawoitorong	
41	Nawoi Kiriow	0766442368	Nawoitorong	
42	Ingolan Nawkesi	0768068433	Nakwamaksur	
43	Etaleng Ayapar	0704236913	Kulapesa	
44	Napus Aemon	0724330331	Kulasamaki	
45	Lolem Achoka	0721241132	Kulamawe	
46	Napamba Sumala Ebakaya	0798436343	Kilimambogo	
47	Ahmbo Ekhott Amakat	0743649966	Kilimambogo	
48	Nakidor Moru	0740896789	Nachukule	

TANA WATER WORKS DEVELOPMENT AGENCY

CONSULTANCY SERVICES FOR DETAILED DESIGN OF LOYAINGALANI TOWN WATER SUPPLY AND SANITATION PROJECT.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PUBLIC PARTICIPATION LIST

Venue: Chief's Office Hall Date: 23/06/22

No	Name	Phone	Village/Designation	Sign
49	Dahir Lentipan	0705926610	Town center	[illegible]
50	ERUPE Aria	0796152862	ST. martin	[illegible]
51	Lominzo Longolemoi	0715367526	Kulamawe	[illegible]
52	AKOLONG Nyangayo	[crossed out]	DIKILKimat	
53	Silvano Gitaloro	07[illegible] 88 9038	Kiwanja	[illegible]
54	Tulanyo Lapuiat	0714572277	Kiwanja	[illegible]
55	Meliantoi orbora	0713548568	Sokoto	[illegible]
56	ARUPE Dabalen	0715237864	Kiwanja	[illegible]
57	Slike somale peninah	0741536995	Kulasamaki	[illegible]
58	Rembey lealuria	0723744635	Kulapesa	[illegible]
59	LINO ILEO SILALE	~~0724~~ 0759810924	Kulesamaki	[illegible]
60	DISMAS L EKIDOR	0707385959	Kilimambogo	[illegible]
61	AEMUN AGOSTINE LOIBACH	0721922199	Kulasamaki	[illegible]
62	Nyak Loreo	0741511210	Nawoya	[illegible]
63	Peter Ekivu.	0703493698	Kason.	[illegible]
64	NOKUNIYAY Nyangayo	0702653590	Kulapesa	[illegible]

TANA WATER WORKS DEVELOPMENT AGENCY

CONSULTANCY SERVICES FOR DETAILED DESIGN OF LOYAINGALANI TOWN WATER SUPPLY AND SANITATION PROJECT.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PUBLIC PARTICIPATION LIST

Venue: Chief's Office Hall Date: 23/06/22

No	Name	Phone	Village/Designation	Sign
65	LOKOL LOREM	0790072654	Kulapesa	[illegible]
66	Andrew Namort	0768366254	Kulapesa	[illegible]
67	Lotorobo Alex	0794607170	Kulapesa	Alex
68	Daniel Lesas	0746363714	Kiwanja.	[illegible]
70	Zebedeo Chur	0740914339	St. Martin	[illegible]
71	Nart kenzo Akaman.	0796954026	kilimambongo	[illegible]
72	Rose. lekulo.	0723755249	kulasamaki	[illegible]
73	Joseph Ekiru Lomuria	0748128108	St. Martins	Joseph
74	Stefania Namkot	0760103728	Kilimango	[illegible]
75	Celina Jumapili	0708751382	Kulapesa	[illegible]
76	Lokwang ardapash	0741308900	Kilimambogo	[illegible]
77	Christina Namoni	0769965421	Nawoitorong	[illegible]
78	lowo			

APPENDIX 3 MARSABIT COUNTY WATER SERVICES MANAGEMENT

NUMBER 1

1. ***Is there a functional institutional arrangement in Marsabit County to support the operation and maintenance of these facilities as well as ensuring compliance with set standard operating procedures (SOP)?***

Review of Marsabit County Water Bill 2018

Institution	Function	Remarks
County Water Department	The County Executive have the overall responsibility of governing water and sanitation issues in the County The County Executive and the Chief Office have constituted a County Water Department to administer water and sanitation issues in the County The County Executive established the following offices as administrative units of the Department • The offices of the County Water Director or Directors; • Sub-County Water Officers; and • Other officers constituted by the County Executive on the basis of a need The County Executive coordinates and perform planning obligation relating to water use in the County including Formulating and publishing the county water and sanitation ten year sectorial plan among others plans Further, the Department has recruited compliance officers in Marsabit Town to enforce provisions of Water Act and regulations issued under this Act	In Loyaingalani the County Government established a Sub County Water Office, the office is currently in-active and requires institutional capacity building. The compliance officers for Loiyangalani have not been recruited as provided in the Water Act for the County
Water Supply And Service Management	The County government of Marsabit has established a Company as a County Water Service Provide called Marsabit Water and Sanitation Company (MARWASCO) that only operated in Marsabit Town. The functions of the Company are as listed below; • Water service provision and sanitation management in urban areas; • Management of village water units in rural areas; • Collection of water use revenues in the County; • Collection of water use data in the County • Management of water works developed by the Department; • Management of any water use resource owned by the County; • formulate and implement pro-poor policies as regards access to water; and	However, In Loyaingalani, MARWASCO has not established an office, However, water services in Loyaingalan are managed by Water Committees through the Village Water Units

	• maintain database related to water and sanitation service	
Village Water Units	The County Executive has established Village Water Unit in target Villages which include; *Nahagan, Kiwanja, Kula Mawe, Kula Pesa, St.Martin, Kula Samaki, Kilimambogo, Soweto Town, Dikilkimat, Nawapa, Nakwamekwi, Achukule, Nawoitorong, Komote*	The village Water Units are headed by Water Committees which are established in all target villages
Private Enterprises	Marsabit County Integrated Development Plan for the period of 2018-2022 outlays that sanitation is done by private individuals who do waste collection at a small fee, and Marsabit Water and Sanitation Company has exhausters for emptying pit latrines and filled up septic tanks. However, it's important to note that African Development Bank is funding Bakuli 4 Dam Water Project and sanitation system in Marsabit town	In loiyangani, resident depend on pit latrines and septic tanks for hotels. Private exhausters occasionally provide exhaust services for filled up septic tanks

2. ***Has Marsabit ensured implementation of proper operation procedures in any other of their towns? In which town is Marsabit County managing faecal sludge collection from households and treatment of the same?***

   The only town with a comprehensive working faecal sludge collection is Marsabit town. There's an ongoing sewer system construction in the town which upon its completion will relieve the exhausters which are currently in use.

3. ***What is their licensing procedures for pit emptiers? Private exhauster truck operators? Gulpers?***

   There's no elaborate licensing procedure for pit empties, but there's a Solid waste collection and management currently privatized function with a private contractor engaged on a year rolling contract by the County Government. Marsabit Water and Sanitation Company has also some exhauster trucks but they are insufficient hence the additional ones from private individuals.

4. *How has the county been ensuring pits and septic tank emptiers have been following proper operations? Have* personal *protection equipment and aren't dumping sludge illegally In other towns in the county? In Loiyangalani?*

   The county doesn't have much resources set aside for the exercise of following up on where the solid waste is dumped or if those doing the collection have personal protection equipment, apart from Marsabit Town where there are contracted people to do the collection. In Loiyangalani town this is done by the department of Public Health.

NUMBER 2.

1. *The kind of household's incentives that can be given to ensure that the villagers embrace proper sanitation practices (building of individual household latrines, hand washing, no open defecation, emptying od pits when full rather than abandon the pit and dig another hole)*

   The kind of incentives majority of the villagers wanted is the tap water closer to their homes, this according to them would greatly improve the sanitation in their homes especially in hand washing. They also requested for an exhauster to be availed in the town to empty up the filled latrines.

2. ***How can they be assisted to develop *lined pit latrines*?***

The only assistance they would require is resources and finance to build the lined pit latrines. They said they have good technicians in the area who could design and develop good looking latrines.

3. ***Where they would prefer public abolition blocks to be built in town? Willingness and ability to pay to use public latrines e.g. near bus stage, market?***

From the public meeting held 23rd June 2022, residents suggest below listed areas for construction of Ablution Blocks

Institution	Number of Ablution Blocks
Loiyangalani Bus Stage	1
Loiyangalani Market	1
Loiyangalani Mosque	1
Loiyangalani Catholic Church	1
Loiyangalani Primary School	1
Loiyangalani secondary School	1
Loiyangalani Vocational Collage	1
Total	**7**

Further, the public was willing to pay for use of the facility up to Ksh 10 per visit

4. ***Where in each village they would propose public abolition blocks to be build. In their view, would women and children be safe to use public abolition blocks at night? What about cleaning? Can they contribute or allocate duties for cleaning? Or pay as you use and employ cleaner/watchman?***

The idea of a public ablution blocks was not welcome by majority of the villagers who preferred individual toilets constructed in each plot or homestead. Lack of elaborate ways to clean the public latrines was a major challenge as they couldn't agree who will do it. They also thought they might not be safe for their women and children to go alone at night.

5. ***If fabricated latrines were supplied in Loiyangalani Town, would they buy them?***

Only a few would be able to afford the prefabricated latrines if they were supplied in Loiyangalani Town so majority turned them down. Though further education on how they work was needed to enlighten them about this concept.

6. ***We need lined pit latrines in Loiyangalani Town to reduce groundwater contamination and also aid sludge emptying instead of abandoning pits and digging others when full. Resident's view on this?***

The only idea of a lined pit latrine they would accept are the public ones not the individuals in people's homesteads. However, with sustained sensitization community members could adopt the idea of lined pit latrines

NUMBER 3

1. ***Awareness campaigns that can be used to embrace proper sanitation measures in Loiyangalani Town.***

NUMBER 4

1. ***Current percentage of residents who can afford septic tanks if water is available.***

   Less than 5% of Loiyangalani the residents would afford septic tanks and these were mainly those living in the town and business people.

2. ***Can residents combine resources to build a latrine per compound?***

   They said they could combine efforts and build pit latrines per compound but with little help from the concerned body in form of a subsidy.

3. ***What do residents think should be the immediate sanitation intervention measures in Loiyangalani Town (within the next 5 years)?***

   The most immediate sanitation intervention measure was said to be increased water supply to the homesteads, additional pit latrines to each homestead also was suggested.

4. ***Where do hotel owners and individual septic tank owners dump sludge when they empty? Who regulates that in Loiyangalani Town?***

   Hotel owners and individual septic owners dump the sludge in the outskirts of the town (location not known could be in the thicket). It's not regulated that much since the town has not many systems in place to deal with sanitation issues. However, there's a designate solid waste collection point about 3kms from the town where wasted is taken and burnt.

5. ***Do residents use standard designs for latrines and septic tanks or everyone constructs what they feel like and can afford at the time?***

   The residents don't use standard designs for latrines and septic tanks, they construct what they can afford at a specific time.

   Any trained fundis who construct latrines and septic tanks in town?

   Yes, there are trained fundis who construct latrines and septic tanks in the town.

6. ***If given loans to construct latrines, can they afford to pay back?***

   Most of the villagers are poor and only depend on their livestock or fish to get income hence if given loans to construct pit latrines they might default or fail to pay back.

7. ***Can they afford to pay for emptying of pits when full or on a regular basis?***

   Only a small section can afford to pay for emptying of the pits when full and this are the business owners.

8. ***If container based sanitation systems were introduced, can they afford to pay the service provider on monthly basis for the service rather than invest heavily for a latrine up-front? Or given their pastoralism practices, they would rather sell an animal and build a latrine rather than a monthly service fee for container based sanitation system.***

   They were not for the idea of container based sanitation systems, it required further forums to enlighten them how it works. Mostly prefers the traditional pit latrines.

NUMBER 5.

1. ***Would local people be willing to run the business of emptying pits, collecting sludge and transporting them to a treatment plant at a fee if they were facilitated with starting capital?***

The locals said they were willing to run the sanitation business through youth and women groups in the town. The starting capital would facilitate their training and establishing a strong foundation for the business.

APPENDIX 4 HEALTH AND SANITATION CAMPAIGN STRATEGY

HYGIENE SENSITISATION AND AWARENESS CAMPAIGN

Introduction

The proposed sanitation education and hygiene awareness activities have been developed to target the projects beneficiaries and urban populations living in the catchment areas of the planned sanitation facilities. Specific attention is given to the promotion of an understanding of the new water borne wastewater systems among the residents of Loiyangalani. This includes the correct use and good management of the facilities, increased awareness of the link between health and improved sanitation practices and promotion of increased environmental awareness.

Objectives of the Hygiene Sensitisation and Awareness Campaign

Hygiene and sanitation comprise of a hardware and a software component. Hygiene and Sanitation hardware involves provision of sanitation infrastructure such as toilets, sewers and septic tanks whereas Hygiene and sanitation software involves activities that assure success of a programme/project/intervention such as policy development, hygiene and sanitation promotion activities, training, monitoring and evaluation. Hygiene and Sanitation software complements the hardware by ensuring that the target beneficiaries utilise the improved sanitation services and by enabling hygiene behavioural change.

The purpose of this hygiene sensitization and awareness campaign is limited to social interventions with the following objectives:

- To empower individuals, schools and/or urban communities with information and knowledge,
- To enable change in behaviour,
- To create demand for sanitation services.

Water, Hygiene and Sanitation (WASH) in Loiyangalani

Marsabit County Legislation for Hygiene and Sanitation

Kenya's 2010 Constitution, which created a devolved system of government, gave the mandate of service delivery to Kenya's 47 county governments. As of January 2017, nearly all counties have built up basic constitutive structures and local government systems. Subsequently, Marsabit County has started to develop guidelines and policies in the WASH and environment.

Marsabit County has only recently drafted its first sanitation policy and bill to complement national policies. These are:

- **Marsabit County Climate Change Mainstreaming Guidelines Water And Sanitation** Sector- provide guidelines for adaptive capacity and resilience of communities and water resource users to the adverse impacts of climate change
- **Marsabit Country Water services Bill 2018 -** An Act of the County Assembly of Marsabit to provide for Water Management services and implementation of National Government Policies on water conservation in Marsabit County and for connected purposes

Marsabit County Institutions for Hygiene and Sanitation

The Marsabit county governments' responsibilities with regards to sanitation include:

- Issuing necessary legislations and by-laws to ensure effective sinisation regulations and enforcements.
- Ensuring the provision of safe, adequate and high standards of environmental sanitation services to all population of the counties without discrimination.

- Establishing by appropriate legislation, a county government agency with the responsibility of actualizing the policy objective of achieving 100 % Open Defecation Free (ODF) and access to improved sanitation access by 2030 at the county level.
- Ensuring the provision of appropriate and adequate sanitation facilities in all public institutions.
- Supervision and monitoring all environmental sanitation services at subcounty and community levels and facilitating coordination among subcounty and community stakeholders in all environment health and sanitation related issues
- Develop sanitation programmes for county cities and towns in consultation with all stakeholders.

The Department of Public Health is responsible for hygiene and sanitation promotion in Marsabit. Sanitation services are provided by Marsabit Water and Sanitation Company (MARWASCO) in Marsabit Town but not in Loiyangalani water where such services are provided by the village water units. MARWASCO is owned by the Marsabit County government and regulated by the Northern Water Works Development Agency
The County Government is responsible for:

- **Solid waste management :** This covers collection and sanitary disposal of wastes - including solid wastes, liquid wastes, excreta, industrial wastes, health-care and other hazardous wastes - storm water drainage, cleaning of markets and other public spaces within the jurisdiction of the city. This is provided either directly or indirectly through private contractors or franchisees,
- **Public health management**: All other environmental sanitation tasks within the city jurisdiction, comprising the public health management functions are carried out by the Environment and Public Health departments of the city, with private sector input where appropriate.
- **Environmental monitoring**: An environmental protection and standards enforcement division/unit within the Environment Department, in collaboration with NEMA, is responsible for monitoring and enforcing environmental standards and regulations set by NEMA. This includes enforcing regulations for households to protect the public against the nuisance of overflowing septic tanks or unacceptable onsite sanitation facilities.
- **Provision of works related to environmental sanitation facilities:** At the county level, the Public Works Department is responsible for the development of sanitation infrastructure and facilities. This is either done directly or indirectly through private contractors or franchisees.

Non-Government WASH Actors in Loiyangalani
None so far was identified in Loiyangalani

Sanitation Education and Hygiene Promotion Approaches
For a Sanitation Education and Hygiene Promotion initiative to be effective, the following are necessary:

- Clear policies and strategies to follow
- Good planning and careful implementation.
- Adequate funding,
- Supportive organizations (both public and private)
- Motivated and well-trained people

- Concerted action and joint measures of WASH projects and organisations working in the area, especially initiatives with the same or a similar target audience.

Another key factor for selecting an appropriate approach and deciding on its implementation strategy is an enabling environment. The political, legal, institutional, financial and economic, educational, technical and social conditions of the project/programme environment are crucial for success. The projects/programs environment could also have negative, constraining characteristics, which should be known prior to the planning process.
Finally, the nature of the target communities in terms of their physical, economic and social characteristics will influence both the focus and the outcome of the approach selected. Software approaches must be well designed to allow changes that are appropriate and sensitive to cultural differences arising from gender, religious beliefs, and customs as well as the different attitudes of people living in either high-density poor or better-off urban locations. A different approach would be required in a dense, crowded urban neighbourhood than in a more sparsely populated formal housing area.

Sanitation Education and Hygiene Promotion Approached for Urban Low-Income Areas (LIAs)

The Kenyan government supports countrywide the **Community Led Total Sanitation (CLTS)** approach, which was introduced in Kenya by Plan International in 2007. CLTS is an approach that was developed to end open defecation by igniting change in sanitation behaviour rather than constructing toilets. Over the past years the CLTS approach, originally designed for rural settings, has been adjusted to the specific conditions in urban settings, such as different property conditions, congested areas with insufficient space for sanitation facilities and strict building regulations.
Some organisations such as AMREF and USAID project have expanded on CLTS by combining **CLTS with sanitation marketing**. AMREF offers access to micro credits to enable households to finance sanitation improvements,
One of the few approaches developed for urban settings is the **Community-Led Urban Environmental Sanitation (CLUES)** approach. CLUES is an approach for planning and implementing sanitation infrastructure and services for disenfranchised urban communities. It is a multi-sector approach encompassing water supply, sanitation, solid waste management and storm drainage. It also involves a range of different actors including households, local councillors, community-based organizations,

Sanitation Education and Hygiene Promotion for Schools
Schools constitute an excellent learning environment for behaviour change. They serve as an entry point for popularizing the use of water and sanitation facilities and advocating for good hygiene habits in families and communities. Primary education in Kenya is free and compulsory therefore primary school attendance is high. Learners spend 8 years in Primary School. Pupils are usually 6 years old when they start school, and 14 when they complete their primary education. The cost of secondary education is subsidized by the government which pays tuition fees while parents are required to meet other requirements like uniform, lunch, transport and boarding fee for those in boarding schools. Despite secondary education being mandatory, there have been challenges in ensuring 100% transition from primary school to secondary school.

The learning potential of many children and adolescents in Loiyangalani LIAs is compromised by poor water, hygiene and sanitation conditions in schools that undermine the learning process. The lack of a regular water supply and proper sanitation facilities in schools is a restricting factor for conveying improved hygiene and sanitation. Hence, education on health and hygiene must go hand in hand with physically safe and well-kept hygiene facilities to make schools safe places for children's development.

Recommended Approach for Sanitation Education and Hygiene Promotion

Awareness campaigns including comprehensive information and skill development measures can be provided at several levels and shall focus on different topics, such as:

- **For households and schools:** Health, hygiene and environmental sanitation, combined with management, and O&M of the proposed waterborne sanitation facilities connected to the simplified sewer system; Also, knowledge about wastewater treatment shall be communicated;
- **For residential communities:** Management, operation and maintenance of the sanitation facilities and pit latrine and abolition blocks to keep them operational;
- **For community based organisations and local administration :** Skills for conducting informative meetings about improved sanitation systems and wastewater treatment;

Additionally, there is also a high need for increased environmental awareness among all the urban stakeholders.

A number of other innovative approaches have been further developed and widely used across the world to reach as many stakeholders as possible with promotional and educational campaigns. Information and awareness creation for sanitation, hygiene, health and environment will be carried out using various communication strategies.

The three main channels that can be be used and are typically used to reach target audiences include:

Interpersonal communication (IPC)	Dialogues in small groups or with individuals through workshops, information sessions and meetings/discussions
Direct customer contact (DCC)	Door to door visits Entertainment education approaches such as theoretical lessons, guided water and wastewater treatment plant site tours, education videos and street shows
Mass media	Print media, TV programs, radio talk shows and mobile phone

Recommended Strategies and Approaches for Loiyangalani Communities and Schools

Recommended strategies and approaches for urban-poor communities and schools are as follows:

- **Landowners are a very significant target group.** According to the socio economic survey, about 76% of households interviewed own their accommodation. In general, it is the responsibility of the house owner to provide tenants with access to basic water and sanitation services.
- **Involvement of Community Health Workers (CHWs) to create awareness and sensitize the population in Loiyangalani is important.** CHWs are part of the existing community health service strategy in Loiyangalani. CHWs are already engaged in health education and hygiene and sanitation promotion in the urban neighbourhoods. These health extension workers maintain close contacts with the households and can deliver additional information and messages.
- **The involvement of influential key persons at community level** to support promotion activities and influence behaviours of people at grassroots level is crucial. Special focus should be put on female influencers. Local leaders, elders, representatives of the community administration and

community-based organizations, as well as the Community Health Workers and teachers should be involved;

- **The use of suitable tools and methods** are crucial for the success of promotional activities., especially methods and tools to be used for non-literate people.
  Organized site visits at wastewater plants for students and adults can be used to provide first-hand information about wastewater collection, conveyance and treatment process. Also, working models of toilets connected to sewers and educational videos will support the understanding of the target audience. Mass media such as radio and smart phones can be used to spread messages and information to a large audience.
  Street Theatre has been used very successfully within educational programmes to reach large groups of people and to spark discussions around certain topics. This is an especially useful tool for illiterate people. However, it is a relatively expensive activity.
- **Water and sanitation education programmes** shall be organized in education institutions. Young people are generally more open and eager to learn and acquire new knowledge, which they pass on to friends and parents.
- **Training and informing teachers from local schools** can support the community awareness process.
- **Ensuring the participation of many different groups in the community** (schools, neighbourhood associations, community groups, health centres, and other local organizations) is key to enhancing the awareness of a broad population in order to increase the acceptance of the proposed sanitation facilities and services.
- **Development of specific activities targeted to achieve the active involvement and participation of women** is important for the success of the campaign.
- **Linking the hygiene and sensitization awareness campaign with other WASH projects** operating in the area and sectors such as Health will reinforce messages and will result in more effective delivery and creation of synergies.

Selected Thematic Areas and Messages for the Sensitisation and Awareness Campaign in Loiyangalani

The thematic areas proposed for the Hygiene and sanitation sensitization and awareness campaign are as shown in table below

Thematic Areas/Messages for Awareness and Sensitization campaign

Thematic Area	Message
Thematic Area 1: 	**Wastewater Education:** Information and knowledge about the new water borne sanitation facilities and Loiyangalani's wastewater management system
Thematic Area 2: 	**Correct use and sustainable management of sanitation facilities:** Awareness creation for correct use, good management and maintenance of the new ablution facilities
Thematic Area 3: 	**Health and Environmental Awareness:** The link between health and improved sanitation practices, and environmental awareness
	Hand Washing with Water and Soap is the most prominent hygiene behaviour to prevent and reduce disease transmission. Special Focus will be on COVID-19 awareness.

Wastewater Education

The main aim of this subject area is to help communities and schools to understand the different water and wastewater services offered by the Project. Currently pit latrines and septic tanks are the predominant sanitation facilities used in informal settlements in Loiyangalani

The campaign will raise awareness on the following items:

- The sanitation issues fading residents of Loiyangalani
- Inappropriate management and disposal of wastewater and its causal link to unhygienic and hazardous environment
- How the wastewater management systems work, wastewater collection, conveyance and treatment as well as why sewers blockages occur and prevention measures.

Besides information transfer through posters and brochures, study and site tours of the local wastewater treatment plant are a good way for project beneficiaries to create awareness and understanding of the complex and expensive wastewater collection, conveyance and treatment process.

The following activities and messages will be used to promote a better understanding of the working of the wastewater system and the ablution facilities, and their importance in reducing environmental contamination:

	Activity / Message
1.	Workshops/Public information sessions at community centres, health units, schools, and other suitable venues to provide information about Loiyangalani existing wastewater management system, the proposed communal waterborne wastewater system in Loiyangalani, and the proposed ablution facilities and line pit latrines ;
2.	Door-to-door visits (Interpersonal Communication, IPC) to the residential neighbourhoods, households and future users of the new sanitation facilities to provide information and increase knowledge about the ablution facilities;

3.	Organized site visits to the wastewater treatment plant for community groups, Master operators / Maintenance Teams of sanitation facilities and students to raise awareness about the complex wastewater collection, conveyance and treatment process.
The effectiveness of leaflets and other written educational tools may be limited due to low literacy rates.	

Correct usage, sustainable management and maintenance of the ablution facilities

For people living in populated urban areas, shared sanitation may be the best alternative for ensuring access to basic sanitation, in Loiyangalani, ablution blocks were suggested in Loiyangalani Market and Bus Park, Loiyangalani Primary, Secondary Schools and Vocational institution and Loiyangalani Catholic Church and Mosque

However, these facilities require to be properly utilized, well managed and maintained in order to ensure accessibility, safety and dignity for all users, particularly women and girls.

The education and awareness creation will focus on correct use, proper management and correct operation and maintenance to ensure community acceptance and correct usage of the new ablution facilities. The campaign shall run parallel with the technical installation.

Door-to-door campaigns, workshops and public information meetings will be used to promote the correct use and proper and sustainable management of the shared ablution facilities as shown below.

	Message / Activity
1.	Door-to-door visits to the beneficiary households of the ablution facilities (interpersonal communication) and Workshops/Public information sessions to: • Inform about the functioning and correct use of the sanitation facilities; • Educate on appropriate anal cleansing material that should be used • To inform on good management practices for shared sanitation facilities and the importance of keeping the facilities clean; • To provide information and increase knowledge about waterborne diseases and how and when they spread. This should be supported by visual leaflet.
2.	Workshops/Training sessions for landowners, Master Operators, Management & Maintenance Teams to: • Create awareness about the need for good management, correct use and regular maintenance of the facilites; • Provide technical Information about the new facilities and lay-out plan of the system • Guide on Standard Operating Procedures (SOPs) and Maintenance plans
The awareness creation and promotional activities will be supported by different IEC materials such as posters, flipcharts, leaflets, and brochures	

A sample of Information, Education and Communication (IEC) material used to educate communities on correct use and maintenance of ablution facilities is shown in the photograph below.

Health and Environment Awareness

Link between Health and Improved Sanitation Practices

The priority hygiene practices that will be promoted will include the following key hygiene behaviours:

- Hand washing with soap and water after defecation, after handling babies' faeces, before feeding and eating and before preparing food
- Safer disposal of human excreta particularly the faeces of young children and babies, and of people with diarrhoea
- Maintaining drinking water free from faecal contamination, in the home and at the source.

The following messages and activities will be used to promote a better understanding about how water, sanitation and hygiene are linked to human health:

	Message / Activity
1.	Door-to-door visits for the beneficiary households of the ablution facilities to provide information and increase knowledge about waterborne diseases and how and when they spread. This activity should be supported by visual leaflet.
2.	Workshops/Public information sessions to: • Create awareness about the importance of hand washing with soap and the five critical times for hand washing: ✓ Wash hands after using the toilet ✓ Wash hands before feeding a child ✓ Wash hands before eating ✓ Wash hands before preparing food ✓ Wash hands after contact with child's faeces, and also, wash hands of children • Inform about the risks of open defecation and promote the use of toilets. • Promote good management and maintenance of the new waterborne toilets • Include information and awareness about the spread and prevention of COVID-19 during the awareness creation/promotion activities

3.	• Posters in the Shared Ablution Facilities reminding users to wash hands after using facilities • In each toilet cubicle a poster to remind users that sanitation waste and other garbage should not be thrown into the toilet • A trash bin should be provided in each cubicle • Women must be encouraged to treat menstrual hygiene waste as solid waste which is to be disposed in the trash bin
4.	Create awareness among households, caretakers and maintenance teams on the dangers associated with improper handling of faecal sludge and about protective measures during maintenance works;

The awareness creation and promotional activities will be supported by different IEC materials such as posters, flipcharts, leaflets, and brochure.

Environmental Awareness

The following messages and activities can be used to promote a better understanding about the environment:

	Message / Activity
1.	During community meetings and information sessions, the campaign will create awareness about the importance of liquid and solid waste management with emphasis on the following: ▪ Uncontrolled discharge of wastewater, illegal dumping of faecal sludge and littering create a high risk for the environmental and human health ; ▪ Solid waste can cause serious negative impacts on health and the surrounding environment. The solid waste blocks the drainage canals leading to flooding of the neighborhoods or if thrown into the toilet, it will block pipes. ▪ Scattered solid waste also increases risk of injury, and infection, especially for children and waste workers
2.	Create awareness among households, caretakers and maintenance teams on the detriment to the environmental cause by improper disposal of faecal sludge;

The awareness creation and promotional activities will be supported by different IEC materials such as posters, flipcharts, leaflets, and brochures

Selected Thematic Areas and Messages for Schools

Effective hygiene education for pupils is not only about teaching children the facts about health risks of bad hygiene practices. It should also focus on changing child hygiene behaviour and that of the community. Hygiene education therefore will focus on:

- Knowledge of practical and theoretical information on hygiene;
- Attitudes and individual opinions about hygiene that influence actions and response to unhygienic situations;
- Practical skills to demonstrate or carry out specific hygiene behaviour

Hygiene education will have a great impact if it focuses on a limited number of risky behaviour. The key hygiene behaviour among pupils that should be addressed by hygiene education activities include:

- Safe use of toilets and urinals;
- Personal hygiene;
- Hand washing with soap;

- Male and female hygiene (Menstual Health Matters for adolescents);
- Waste management and water drainage;
- Water treatment, handling and storage;
- Food hygiene

For hygiene education to be effective, it should employ methods that promote active child participation. This will be achieved through the following two ways:

- Through participatory teaching methods used by teachers or through special hygiene teachers in schools, during school hours as part of the regular curriculum;
- Through school health clubs within the school and other hygiene and environmental clubs outside the school.

Implementation Strategy for the Respective Target Groups

The objectives and expected outcome of the sensitization and awareness campaign for specific target groups are as shown below:

Implementation Level	Objectives	Expected Outcome
The County of Marsabit (Department of Public Health)	Awareness and Commitment, Promotion	Improved Attitude, Increased Capacity & Practical Action
• MARWASCO	• Awareness & Commitment, Promotion	• Improved Attitude, Increased knowledge, and Capacity
• Operators, Maintenance Teams	• Knowledge, Awareness & Commitment	• Improved Attitude & Practical Action
• Landowners/landlords, Beneficiary Households, and schools	• Knowledge, Awareness & Commitment	• Practical Action

- The different 'actors', their roles and proposed activities for their contribution to the sanitation education and hygiene promotion initiative are discussed in the following subsection.
- Marsabit County
- The following activities are proposed to be implemented by the County Government:

• Implementing Level	Message / Activity	Media	Target Groups
• The County of Marsabit	Awareness creation / training of County Government staff in: • Good management and correct use of waterborne sanitation facilities (such as information about the consequences of	• Workshops • Information sessions • posters, brochures, flipcharts	County Staff and extension staff and residents of Loiyangalani

(Department of Health)	misuse of the sanitation system by throwing solid matter and garbage into toilets)		
• Loiyangalani Town	• Information dissemination: - relevant regulatory framework and by-laws for sanitation and liquid/solid waste management and their enforcement	• Radio/ media campaign • hand-outs	Landowners, Landlords, Facility users and residents of Loiyangalani

Marsabit Water and Sanitation Company

. The following activities are proposed for implementation by MARWASCO.

Implementing Level	Message / Activity	Media	Target Groups
MARWASCO	Increase knowledge of Loiyangalani residence about: • The existing and proposed wastewater system in Loiyangalani and how it works.	• Workshops • Public information meetings • Site visits • posters, brochures, and Hand-outs	MARWASCO Staff (Technicians, Plumbers, Artisans) Operators, Household Heads
MARWASCO	• Raise awareness about MARWASCO, the department responsible for customer service and operating hours • Provide free hotline number for failure notification, irregularities and for raising other issues	• Workshops • public information meetings • Site visits • Posters, brochures, and Hand-outs	Household Heads
MARWASCO	• Provide information about the correct use of the waterborne ablution facilities; • Inform about risks in case of misuse of the sanitation facilities and the sanitation system • Inform about the dangers of uncontrolled release and spillage of untreated wastewater into the environment	• Workshops • Information meetings • Door-to-door visits • Brochures, Hand-outs • Interactive Street shows	• Loiyangalani residents (focus on households sharing the ablution facilities, managements & maintenance teams)

Master Operators / Maintenance Teams / Pit Emptiers

The following activities are proposed for the management and maintenance personnel:

Implementing Level	Message / Activity	Media	Target Groups
Master Operators / Maintenance Teams	• Technical information about the ablution facilities and the sanitation facilities to ensure correct use and maintenance	• Workshops • Informative meetings • Brochures, Hand-outs	Master Operators / Maintenance Teams of sanitation facilities in Loiyangalani
Master Operators / Maintenance Teams and MARWASCO staff	Occupational Health & Safety: • Promotion of health awareness, safe working techniques. • Guidelines (SOPs) for safe maintenance works	• Workshops • Informative meetings • Brochures, Hand-outs	

Landlords, Users, CBOs and Education Institutions

The proposed interventions for the Loiyangalani will focus on the landowners/landlords, the households sharing the ablution facilities, community groups and relevant institutions in Loiyangalani and the schools where new sanitation facilities will be constructed.

Loiyangalani Residents, Property Owners and CBOs

The project shall focus on the following interventions:

Implementing Level	Message / Activity	Media	Target Groups
Local leaders, property owners and other relevant community-based groups and partners	• Adaptation of existing information and training materials, and according to need, preparation of additional IEC materials for urban informal settlements • Training workshops for local promoters with focus on key-messages • Public meetings about wastewater treatment and the sewage system in Marsabit organized by MARWASCO and chaired by local leaders • Radio talk shows with local experts, (e.g. MoH, medical and environmental experts, MARWASCO, countycouncil staff) and local leaders • Global events (World Toilet Day, World Environment Day, Water Day) can be used for raising awareness on improved sanitation	• Workshops, • Information Sessions, • Meetings/ Discussions • Direct customer contact through door-to-door visits, • radio, Posters • Brochures & hand-outs)	Local leaders, landowners /landlords, beneficiary Households and residents in Loiyangalani groups

Education Institutions

Raising awareness on hygiene and sanitation should conducted for both children/students and adult members of Loiyangalani to allow for reinforcement of information at family level. This has been proven to give more sustainable results. Both school management/ teachers and students will be targeted with the activities.

The main objectives of the activities for schools are as follows:

- To raise awareness,
- To educate the students about environmental matters

- To educate students on how improved sanitation is linked to a clean and healthy environment
- To get students actively involved in protecting their environment

The aim is that students gain a better understanding of wastewater management and sanitation service. This includes awareness about environmental pollution due to open defecation, illegal dumping and spillage of faecal sludge and sewage, greywater runoff, abuse and vandalism of the WASH service network. In-house education activities will be supplemented by study tours to the local water and wastewater treatment utility.

Sanitation and hygiene awareness and promotion activities proposed for schools in Loiyangalani include:

			Target Groups
Selected primary and secondary schools, school management, teachers, students	• Information and awareness about environmental contamination through human faeces and sewage • Information sessions about wastewater treatment, sanitation network • Site visits to water and wastewater treatment plants • Proper use and management of the new water borne sanitation facilities	• Meetings and Info sessions, • promotional tools (manuals, posters, hand-outs, educational video) • Study tour to water and sanitation utility	Students, teachers, Parent associations, and families
	• School events for Global Days such as. World Water Day (22 March), World Toilet Day (19 Nov.), World Environment Day (5 June) etc., will be organized Such events may include inter-school competition (drama, music and sport events) with themes about sanitation and hygiene		Students, teachers, community

Monitoring and Evaluation

The awareness and sensitization measures need to be carefully monitored and evaluated to ensure that the activities have a genuine impact on the target groups. This might include the establishment of a coordinated monitoring and evaluation system and conducting periodic reviews at all levels.
Monitoring and evaluation of the awareness creation and educational programmes aims to:

- Track the progress in behavioural changes and the correct use of the improved sanitation and hygiene facilities.
- Identify challenges and possible solutions
- Document lessons learned and best practices that will enable improving the sanitation promotion campaign or activity, such as improved design of sanitation facilities, promotion and communication activities, improving the enabling environment etc.

Health impacts from hygiene & sanitation promotion are very difficult to assess due to the multitude of factors affecting human health. Observations on the use and maintenance of sanitation facilities and improvements in personal hygiene practices can provide evidence of behaviour changes – although the latter is, of course, difficult to monitor.

Relevant activities for monitoring and evaluation the hygiene and sanitation promotion campaign include:

- Conducting monitoring activities to assess the knowledge of the primary target groups (Loiyangalani residents, key figures in target communities, school children, etc.) about crucial hygiene behaviours, as well as an evaluation of concrete actions taken.
- Conducting supportive supervision for community-based hygiene and sanitation promoters e.g. Community Health Workers along with the MoH and County Government's Department of Health and Sanitation.
- Conducting supportive supervision of the sanitation services provided by MARWASCO (number of sanitation service customers, payment levels for sanitation, reported incidents such as blockages, illegal connections, vandalism) and private sanitation service providers such as pit emptiers and solid waste collectors for improved operation and regulatory compliance.
- Supporting the development of quality control and standardization procedures for existing and new public and private sanitation services.
- Conducting baseline, midterm, and end term evaluation on results and impact of the promotional activities.

Budget for Sanitation and Hygiene Sensitization and Awareness Campaign

Effective awareness campaigns require sufficient funds and personnel, adequate time and constant follow-up to have a positive long-term impact. **T**he PIC proposes that the campaign starts at Technical Design stage and continues during construction supervision through to initial operation of the sanitation facilities with follow-up visits to offer support in case of any arising issues. The total estimated cost for the campaign is **KShs. 00000000.** The estimate cost for the Hygiene & Sanitation Sensitization and Awareness Campaign is summarized in Table 1-2

Estimate Cost for the Hygiene & Sanitation Sensitization and Awareness Campaign

Item	Description	Amount (KShs)
	Primary Target Group	
1	**Landlords and Users of the new water-borne sanitation facilities:** • *Development of information/training materials and signage for toilet cubicles* • *Conducting workshops and public information sessions* • *Door to door visits before commencement of construction and prior to commissioning of ablution blocks as well as follow up visits* • *Field trips to wastewater treatment plants* • *Monitoring and documentation of all activities*	0000
2	**Influential Local Key Persons and Groups such as Local Leaders, CBOs and CHW:** • *Conducting workshops and Training of Trainers (ToT) sessions* • *Monitoring and documentation of all activities*	0000

Item	Description	Amount (KShs)
3	**Master Operators:** • *Development of information and training materials* • *Conducting workshops and training sessions for MOs* • *Monitoring and documentation of all activities*	000
4	**Academic Institutions:** • *Development of information and training materials* • *Orientation and Information sessions for teachers and school management* • *Conducting Information sessions for students* • *Monitoring and documentation of all activities*	000
	Secondary Target Group	
5	**MARWASCO and County Government Extension Staff:** • *Development of information and training materials* • *Conduct workshops and ToT sessions* • *Monitoring and documentation of all activities*	0000
TOTAL		**0000**

APPENDIX 5 VOLUNTARY LAND DONATION FORM

VOLUNTARY LAND DONATION (OR LAND LEASE) FORM

We: COMMUNITY'S LEADERS AND OPINION ELDERS AND STAKEHOLDERS OF LOIYANGALANI.

person(s) exercising customary/communal rights over land described below in:
Town LOIYANGALANI
Sub County LOIYANGALANI
County MARSABIT.

Hereby declare that we/the group are the users of the land required for **Construction of Loiyangalani Town Water and Sanitation Project** as described in **Appendix A.**

We are voluntarily donating the use of land described in **Appendix A** for the purpose of Construction of **the said Project.**

We agree to this purpose from **(date)** 21/2/2024., for as long as the purpose is served.

We make this donation of Our own free will. We are waiving Our right to compensation of any kind for the specified duration of the activity.

We affirm that we have been fully and freely consulted and informed about the activity prior to agreement, have not been subject to any form of coercion, understand that we have the right to refuse, and to seek redress for any grievance concerning this transaction.

Signed:

A. **Council of Elders Representative:**

Name SULEIMAN ISA'CK
Signature:
Date: 21/2/2024

B. **Chief or Local Custom Authority**

Name JOHN L. ORBORA
Signature:
Date: 21/2/2024

C. Representative of concerned Government Agency

Name of Agency: _____

Name of representative: _____

Signature: _____

Date: _____

Attached as Appendix C is the list of attendees who also consented to the above.

APPENDIX A TO THE VOLUNTARY LAND DONATION FORM: LAND REQUIREMENTS – LOIYANGALANI WATER AND SANITATION PROJECT

1. **Water Supply Component**

Water Component	Details	Land size required	Coordinates
Spring intake at Ngobeleng	Riparian land.		X = 249712.701 Y = 309217.588
Boreholes in the vicinity of Ngobeleng spring site	7 boreholes	15 acres in the vicinity of Ngobeleng spring site (towards Mt. Kulal)	X = 249800.061 Y = 309239.980
Water treatment Plant (WTP) at Ngobeleng		The proposed new WTP to the East of Loiyangalani sub-location will require acquisition of approximately 10 acres of land belonging to the community as grazing land to be acquired through voluntary land donation forms signed between the community leaders and Marsabit County	X=249528.203 Y= 309166.998

Gravity Transmission Main Pipeline, Approx. 3.5km long:	Traversing communal grazing land. From existing elevated tank at Ngobeleng, along existing road to the end of that road.	Wayleave only - Communal and private grazing - lands cumulated to a total of (6 acres for a 4km pipeline route from Ngobeleng to the distribution network) will be acquired as easement in cases where the pipelines alignment traverses through private and communal land	
Storage Tanks	These will be at the Water Treatment Plant Site	No additional land above what is required for Water Treatment Plant	
Pumping Station:	These will be at the Water Treatment Plant Site	No additional land above what is required for Water Treatment Plant	
Distribution Network	Approximately 30 km total length of various	**These will be on road reserve**	

	diameter of HDPE and steel pipes, valves and fittings, including associated concrete and masonry works in pipeline supports, valve chambers, washout drains, etc. as shown in the bill of Quantities and drawings		
Komote village reverse osmosis water treatment units	Elders identified best location and confirmed availability of land.	Half an acre	

2. Sanitation Component

Sanitation Component	Details	Land size required	Coordinates
A. Faecal Sludge Treatment Plant		The proposed land for FSTP will also need to be acquired, approximately 10 acres of land belonging to the community as grazing land will be acquired through voluntary land donation forms	X= 245081.70 Y = 311143.55
B. Kiwanja Ndege	One Communal/public ablution block of latrines with 11 doors –	Eighth of an acre	X= 246883.92 Y=306502.01
C. Bus Stage/ Market	One Communal/public ablution block of latrines with 11 doors –	Eighth of an acre	X= 246198.52 Y=305737.96

D. Kula Mawe	One Communal/public ablution block of latrines with 11 doors –	Eighth of an acre	X=247727.65 Y= 303771.37
E. Two other ablution blocks in the commercial areas	Each place - One Communal/public ablution block of latrines with 11 doors –	Two-eighths of an acre	

APPENDIX 6 STAKEHOLDER ENGAGEMENT PLAN

Stakeholder	**Specific org / agency**	**Message**	**Communicator**	**Delivery method**	**Schedule**	**Comment**
Who will you communicate to?	*Who exactly will be targeted at this level?*	*What is the topic of the message?*	*Who will the communication be from?*	*How will the communication be delivered?*	*When will it happen and how often*	*Other important information*
1. National level	National level partners: MoWSI, NLC, Treasury, etc.	Status of completion of the project	The CEOl's Office – the RE/RD to provide the project-specific information	-Status report -Meetings Website	Every 6 months	The CEO's office will decide on the agenda, which would include briefing on the progress
2. County level stakeholders	Government and county government	-Status of completion -Challenges	The RE through the RD's Office	-Regional meetings (CC's office) -Status report -Website	Every quarter	There are regular partners meeting at the county level that could be leveraged
	Government agencies – KPLC, NEMA, NLC, etc.	-Status of completion -Challenges	The RE through the RD's Office	-Regional meetings (CC's office) -Status report -Website	Every quarter	Status report to be produced quarterly and shared to all regional offices
	Business community	-Status of completion -Changes /plans -Challenges	The RE	-Status report -WhatsApp -Email -Website -Pictorial representation of the water and sanitation	Face-to-face meetings – quarterly or on need basis	Newsletter to be produced monthly and effective use of WhatsApp and SMS platforms
Community level	PAPs	-Progress on compensation -		-Group meetings - Individu	Monthly meetings with the flexibility	The PAPs tend to have many

Stakeholder	Specific org / agency	Message	Communicator	Delivery method	Schedule	Comment
Who will you communicate to?	*Who exactly will be targeted at this level?*	*What is the topic of the message?*	*Who will the communication be from?*	*How will the communication be delivered?*	*When will it happen and how often*	*Other important information*
		Changes in plans	The designated officer	al consultations -FAQs -Status report -SMS	of on-need basis	issues that would require to be addressed in a timely manner
		-Progress on the project completion -GRM outcomes		-Pictorial representation of the water and sanitation		
	GRM committee	-Progress on compensation -Changes in plans -Progress on the project completion -GRM outcomes	The designated officer	-Committee meetings -FAQs -Status report -SMS -Posters -Letters -Pictorial representation of the water and sanitation	The committee is expected to meet quarterly or when there are matters requiring intervention	As the water and sanitation expands, there will be many issues to be addressed by the committee
	Community members	-Progress on the project completion -Changes in plans -Address any complaints and /or concerns	The designated officer	-Barazas -FAQs -Status report -SMS -Pictorial representation of the water and sanitation	Monthly	FAQs will be developed once but shall need to be reviewed based on programmatic and contextual changes
	CSOs	-Progress on the project		-Group meetings -FAQs	On need basis but they will	They may ask for meetings

Stakeholder	**Specific org / agency**	**Message**	**Communicator**	**Delivery method**	**Schedule**	**Comment**
Who will you communicate to?	*Who exactly will be targeted at this level?*	*What is the topic of the message?*	*Who will the communication be from?*	*How will the communication be delivered?*	*When will it happen and how often*	*Other important information*
		completion -Address any complaints and /or concerns	The designated officer	-Status report -Website -WhatsApp -SMS -Pictorial representation of the water and sanitation	be encouraged to be part of the monthly community meetings	with the project team which should be obliged depending on the urgency

APPENDIX 7 POLLUTION PREVENTION PLAN

Ref.	Topic	Location	Requirement	Responsibility	Verification Process
PP01	General pollution prevention	All	The equipment shall be brought to the site in perfect state of operation, the technical revisions and oil exchange being already made	Contractor	Internal audit program
PP02	General pollution prevention	All	All plant, vehicles and equipment to be maintained to manufacturers standards and maintained in accordance with the provisions of the latest Government of Kenya directives. This includes regular inspections of plant and equipment to prevent leakage/emissions and technical periodical checks of emissions (carbon monoxide and exhaust gases). A plan for this to be created including processes to remedy potential defects.	Contractor	Internal audit program
PP03	General air emissions control	All	All installations to be well maintained with appropriate valves, fittings and flanges.	Contractor	Internal audit program; Periodic inspections
PP04	General air emissions control	All	Idling of vehicles or equipment to be restricted to minimize emissions.	Contractor	Internal audit program
PP05	General air emissions control	All	Use and maintain effective filters in vehicle cabs to keep air free of dusts and fumes	Contractor	Internal audit program,

					Visual inspections
PP06	General air emissions control	All	The vehicles transporting materials issuing fine particles in the air shall be covered with tarpaulin	Contractor	Periodic inspections
PP07	General air emissions control	All areas, but especially areas with large mammals	All powdery/dusty materials to be stored in enclosed containers or covered to avoid wind dispersal. Dust producing activities to be reduced during strong winds or to be controlled by dust suppression techniques e.g. water sprinkling, use speed controls, all-weather surfaces	Contractor	Periodic inspections
PP08	General air emissions control	-Residential area	An Air quality monitoring program shall be implemented, especially close to the residential areas that determined the impact significance to be "high", in the surroundings of the GCS and site organizations areas	TWWDA, NWWDA, Marsabit County /Contractor	Analysis reports
PP09	General noise control	All	All plant and machinery to be fitted with appropriate noise baffles / silencers to keep noise emissions within normal operating/regulatory limits.	Contractor	Internal audit program, Visual inspections
PP10	General noise control	All	Provision of noise barriers for static equipment where appropriate especially when noisy work (eg. hammering) is being conducted.	Contractor	Internal audit program, Periodic inspections

PP11	General noise control	All	Generators and water pumps required for 24-hour operation will be super-silenced or screened/located as appropriate to reduce noise; Crane spindles, pulley wheels, telescopic sections and moving parts of working platforms will be adequately lubricated in order to prevent undue screeching and squealing; and, where possible mains electricity will be used rather than generators.	Contractor	Internal audit program, Periodic inspections
PP12	General noise control	All	Personnel will be instructed on best practice measures to reduce noise and vibration as part of their site induction training; Shouting and raised voices will be kept to a minimum e.g. in cases where warnings of danger must be given. Use of audio radios in the open environment will be prohibited except where two-way radios are required for reasons of safety and communication; Control of noise introduced into site induction to ensure that all operators on site, including contractors, are working in such a way to minimize noise;	Contractor	Internal audit program, Periodic inspections
PP13	General noise control	All	Compliance monitoring of noise to ensure limits are being met.	Contractor	Analysis reports

PP14	General noise control	All	All materials will be handled, stored and used in a manner that minimizes noise, this include the preclusion of dropping material which would be placed in all instances; Routes and programming for the transportation associated with the works will be carefully considered in order to minimize the overall noise impact generated by these movements and will conform to the operational hours of the works Provision of temporary acoustic barriers (or other means) for use when operations are exposed or are identified as problem activities; Appropriate complaint procedure to ensure complaints are logged, investigated and resolved; and, Control of noise introduced into site induction to ensure that all operators on site, including contractors, are working in such a way to minimize noise.	Contractor	Internal audit program, Periodic inspections
PP15	General noise control	Site establishment platform wash water	Piling and ground stabilization would be suitably controlled on site if necessary (However, due to the large separation distances to the nearest receptors this is not considered an issue); Isolation of pumps and generators when positioned in close proximity to sensitive receptors to prevent direct vibration transfer; Selection of appropriate equipment for the task required; Appropriate training with regard to plant operational techniques so as to minimize vibration generation; Appropriate complaint procedure to ensure complaints are logged, investigated and resolved.	Contractor	Internal audit program, Periodic inspections

PP16	General spill prevention	All	Standard industry refueling protocols should be followed. Vehicles maintenance to be undertaken on a purposely provided drip tray. Secondary spill containment to be provided wherever refueling or storage occurs. All materials to be properly contained for decanting with fill areas to contain any spillage during transfer.	Contractor	Internal audit programme, Periodic inspections
PP17	General spill prevention	All	The exchange of oils shall be done in specialized workshops	Contractor	Internal audit programme, Periodic inspections
PP18	General spill prevention	All	Spill kits should be continually available and all site assemblies will be equipped with specific materials necessary for the intervention in case of accidents (hydrocarbon leaking), so that any possibility for extension of pollution may be avoided	Contractor	Internal audit program, Periodic inspections
PP19	General Spill prevention	All	The measures required for the prevention of soil pollution with drilling fluid shall be taken	Contractor	Internal audit program, Periodic inspections
PP20	General Spill prevention	All	Perform simulations regarding emergency situations in case that an accidental pollution is caused, having impact on the water resources	TWWDA, NWWDA, Marsabit County /Contractor	Internal audit program

PP21	General Spill prevention	All	Fuel handling, especially bulk storage, will take place in secure bounded areas. Similar conditions will apply to lubricant oils, chemicals and liquid wastes. Should a spill occur, polluted soils will be cleaned up or removed for appropriate disposal. All wastes will be handled, stored and disposed of as per local regulations. Diesel and other potentially polluting liquids will be stored in appropriate containers, fitted with secondary containment. Fuel equipment shall be supplied by oil pump, and tanks with automatic alarms and shut off systems to be installed in all refueling areas. All areas to be checked prior to delivery to prevent overfill and spillage.	Contractor	Periodic inspections
PP22	General Water resource protection	Activities of record keeping, correspondence, supervision and site inspector.	All working areas to have appropriate ecological toilets to be emptied by authorized operators	Contractor	Periodic inspections
PP23	General Water resource protection	Domestic waste from construction camps, pipe deposits and work fronts	Domestic wastewater to be separated from hazardous, oily water discharges at all sites	Contractor	Periodic inspections
PP24	General Water resource protection	From activities concerning: - Maintenance of equipment,- Building demolition- Pipelining	Contractors will develop and implement an appropriate plan to prevent accidental water pollution based on the LOIYANGALANI WATER AND SANITATION commitments requirements.	Contractor	Internal audit program

PP25	General Water resource protection	Support activities to the shore, packaging, casings, various carpentry works.	Standard Pollution prevention measures will be implemented i.e. to prevent silt contamination by keeping water out of the works area using appropriate isolation techniques, such as coffer dams and bypass channels.	Contractor	Periodic inspections
PP26	General Water resource protection	Pipe trench excavation, foundations, building access roads, land systematization.	Sewage treatment plant at GCS will be carefully maintained strictly respecting the timing of maintenance and emptying	TWWDA, NWWDA, MARSABIT COUNTY	Wastewater plant maintenance manual
PP27	General Water resource protection	Pipe cleaning	Demarcation and offsets for camp and storage locations and field activities of at least 50 m from watercourses where possible.	Contractor	Periodic inspections
PP28	General Water resource protection	Pipeline preparation	Monitoring the meteorological bulletins meant to take the equipment outside the areas which could be flooded, in case of high waters	Contractor	Internal audit programme, Periodic inspections
PP29	General Water resource protection	All	Implement measures against sedimentation. Use of settling ponds, silt fences and screens to prevent sediment transport	Contractor	Periodic inspections
PP30	General Water resource protection	All	Wastewater should be prevented from entering surface water bodies without prior assessment and treatment if necessary	Contractor	Periodic inspections

PP31	General Water resource protection	Watercourse	The placing of concrete in, or near to, any watercourse must be controlled to minimize the risk of pollution	Contractor	Periodic inspections
PP32	General Water resource protection	Site organizations	The adequate collection and treatment of all the used waters which will result from the site organizations so that no impact is caused on the waters	Contractor	Periodic inspections
PP33	General Water resource protection	All	Ensure contaminated water from dewatering or cement washing operations is treated prior to discharge, depending on the nature of the contaminants	Contractor	Periodic inspections
PP34	General Water resource protection	Access ways	Accomplish polders of small dimensions having a sediment exclusion role, respectively for stilling the leaking force of pluvial waters, to be accomplished along the access ways at distances of approximately 30- 50m. The development of polders shall be accomplished on surfaces of up to $10m^2$ and at a maximum depth of 30cm, being provided with diffuse leaking areas, in steps oriented upstream, in order to avoid the occurrence of erosive phenomena, at distances of 2-3m to the access ways, being used as accumulation areas (aggregation) of the species of amphibians and not only, outside the areas having a potential for negative impact (access ways).	Contractor	Periodic inspections
PP35	Traffic	All	Vehicle tyres should be cleaned at the exit from the working areas, in case of use of public roads	Contractor	Periodic inspections

PP36	General principles	Works site	Works sites will be subject to legally binding documents that will ensure the transfer of ownership. Based on these documents, environmental responsibilities are specifically defined to be transferred to the entrepreneurs and subsequently to the Client, following the responsibilities for each stage to be clearly defined and assumed.	Contractor/TWWDA, NWWDA, MARSABIT COUNTY	
PP37	General principles	All	Works organizations will be established by accurate legal documents that will determine the distinct responsibilities of entrepreneurs, assumed compensation, but also the breach to restore them to the initial state. Based on these documents, environmental liabilities will be clearly defined in the protocols of pre-defining environmental tasks undertaken. Thus, the principles underlying the specific legislation in force (especially the principle: the polluter pays), the contractor will undertake to remedy any fault of its negative effects.	Contractor/TWWDA, NWWDA, MARSABIT COUNTY	
PP38	General principles	All	The workforce will be provided with environmental awareness training.	Contractor	Trainning records
PP39	Traffic	On-site Traffic Management	Dust emissions due to road travel shall be minimized by regulating vehicle speed and watering roads (where required).	Contractor	Periodic inspections
PP40	Traffic	On-site Traffic Management	Prepare necessary reports, inspection logs and incident records.	Contractor	Records
PP41	General pollution prevention	All	Vehicles will be maintained in accordance with manufacturer guidelines and Kenyan licensing requirements and periodic verification inspections will be undertaken.	TWWDA, NWWDA, Marsabit County /Contractor	Internal audit programme

PP42	General principles	All	Reducing exposure times for people working near noisy machinery	Contractor	Internal audit programme
PP43	General	All	For the pre-construction stage when work sites will be in place for each sector there will be a protocol that will establish as accurately as possible the environmental load, based on standardized forms (standard-forms), with aerial photographs or photographic images taken from the ground, which will act as control elements. For each site during the growing season (May-September the ecological structure and functions of the site will be accurately determined.	TWWDA, NWWDA, MARSABIT COUNTY	Records
PP44	General principles	All	Comply with all mitigation measures included in the Environmental Agreement	Contractor	Internal audit program
PP45	General principles	All	Investigate all incidents and identify any necessary corrective actions	Contractor	Internal audit program Records
PP46	General	All	Noise and vibration from plant and machinery will be controlled by ensuring that: 1) Engine compartments are closed when equipment is in use 2) Resonance of body panels and cover plates is reduced by the addition of suitable dampening materials Any "rattling noise" is addressed by the tightening of loose parts or the addition of resilient materials if appropriate; Siting of semi-static equipment will be orientated as far as is reasonably practicable from noise-sensitive	Contractor	Internal audit program

			receptors with localised screening if deemed necessary.		
PP47	Water resource protection	Water Courses	All pumps, motors and combustion engines to be operated with drip trays underneath and set back from watercourses (minimum of 20m).	Contractor	Periodic inspections

APPENDIX 8 WASTE MANAGEMENT PLAN

Waste Type	Management Measures	Responsible Parties	Timelines	Monitoring Frequencies	Reporting Mechanisms
Construction Debris	1. Segregate and recycle materials (concrete, metals, etc.). 2. Proper disposal at authorized landfill sites.	Site Manager	Throughout construction period	Weekly audits	Site Manager reports to Project Manager
Hazardous Waste	1. Identify and segregate hazardous materials. 2. Engage licensed waste disposal services for proper disposal.	Environmental Officer	As generated	Before and after disposal events	Environmental Officer reports to Project Manager
Electronic Waste (e-waste)	1. Segregate e-waste for proper disposal or recycling. 2. Engage certified e-waste recycling services.	Construction Supervisor	As generated	Monthly audits	Construction Supervisor reports to Project Manager
Concrete Washout	1. Designated areas for concrete washout. 2. Use containment systems to capture washout water. 3. Proper disposal.	Site Engineer	As generated	After each concrete activity	Site Engineer reports to Construction Manager
Water Testing	1. Regular testing of water quality for construction activities. 2. Control pH levels to meet environmental standards.	Environmental Technician	Weekly during construction	Daily for pH levels, Weekly for water quality	Environmental Technician reports to Project Manager
Equipment Maintenance	1. Perform maintenance in designated areas with proper containment. 2. Have spill response kits readily available.	Maintenance Supervisor	As needed	Monthly inspections	Maintenance Supervisor reports to Construction Manager

Operation Phase:

Waste Type	Management Measures	Responsible Parties	Timelines	Monitoring Frequencies	Reporting Mechanisms
Treated Sludge (FSTP)	1. Manage effluent according to environmental standards. 2. Explore reuse options or arrange for safe disposal.	Plant Operations Manager	Ongoing	Continuous monitoring	Monthly reports to Environmental Officer
Treated Water (WTP)	1. Manage residuals from water treatment. 2. Follow proper disposal or reuse practices.	Water Treatment Specialist	Ongoing	Weekly for residuals, Monthly for reuse	Monthly reports to Environmental Officer
Water Distribution Lines	1. Properly manage residues and sediments during cleaning activities.	Distribution Supervisor	Ongoing	After each cleaning activity	Weekly reports to Plant Operations Manager
Monitoring and Testing	1. Regular water quality monitoring to meet regulatory standards 2. Effluent quality testing for treated sludge.	Environmental Technician	Monthly	Daily for water quality, Weekly for effluent	Monthly reports to Environmental Officer
Community Engagement	1. Conduct awareness programs for proper waste management practices. 2. Establish reporting mechanisms for concerns.	Community Liaison Officer	Ongoing	Quarterly community engagement programs	Quarterly reports to Project Manager
Emergency Response	1. Develop and communicate emergency response procedures for spills or releases. 2. Regularly update and train staff.	Health and Safety Officer	Ongoing	Bi-annual drills	Bi-annual reports to Project Manager
Regulatory Compliance	1. Strict adherence to local environmental regulations governing waste discharges. 2. Regular compliance assessments.	Environmental Officer	Ongoing	Annual assessments	Annual reports to Project Manager

Continuous improvement and regular updates to the plan are essential throughout the construction and operation phases.

APPENDIX 9 HYDROGEOLOGICAL INVESTIGATIONS REPORT