THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF WATER AND IRRIGATION
WATER SECTOR DEVELOPMENT PROGRAM (WSDP)
CONTRACT NO. ME-011/2016-2017/CONTR/C/05

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FINAL

CONSULTANCY SERVICES FOR REVIEW AND UPDATE OF DOCUMENTS FOR IMPROVEMENT OF WATER AND SANITATION SERVICES IN MOROGORO MUNICIPALITY

JANUARY 2018

SEURECA VEOLIA In Joint Venture with seureca East Africa Ltd. and NETWAS (T) LTD CONSULTING ENGINEERS

GENERAL INFORMATION

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VERSIONS

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V2	January 2018	Environmental Impact Assessment Report

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LIST OF ABBREVIATIONS

AS	Activated Sludge
BOD	Biological Oxygen Demand
CBD	Central Business District
CBOs	Community Based Organizations
COD	Chemical Oxygen Demand
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EWURA	Energy and Water Utility Regulatory Authority
IFC	International Finance Corporation
MCM	Million Cubic Meter
MORUWASA	Morogoro Urban Water Supply and Sanitation Authority
NAWAPO	National Water Policy
NEMC	National Environment Management Council
NEPAD	New Partnership for Africa's Development
NGOs	Non-Governmental Organizations
NSGRP	National Strategy for Growth and Reduction of Poverty
NWSDS	National Water Sector Development Strategy
PEA	Preliminary Environmental Assessment
OP	Operating Procedures
ROW	Right of Way
TAC	Technical Advisory Committee
TANESCO	Tanzania Electricity Supply Company Limited
TOR	Terms of Reference
URT	United Republic of Tanzania
USRP	Urban Sector Rehabilitation Project
WBO	Water Basin Office
WHO	World Health Organization
WSDP	Water Sector Development Programme

WSP	Waste Stabilization Ponds
WTP	Water Treatment Plant

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1.0 EXECUTIVE SUMMARY

Introduction

Water resources have direct impacts on the quality of life of each and every individual. Tanzania has long been viewed to possess enough water for the country's development needs. However, the demand for water is increasing faster than the available supply. The rapid population growth results in huge demands for water, food and energy. The competition between agriculture and energy, crop and livestock production, industrial and human uses is becoming more evident than before. Consequently, there is a growing list of costly infrastructures for generating power, irrigation, and water supply that is no longer reliable. Climate change also affects water availability and use and impact water security. Limited water supplies must be fairly allocated and efficiently used.

As such, the Ministry of Water and Irrigation on behalf of the Government of Tanzania proposed the improvement of water supply and sewerage services in Morogoro Municipality. The proposed project is part of the Water Sector Development Programme (WSDP), which is being implemented by the Government of the United Republic of Tanzania through Morogoro Urban Water Supply and Sanitation Authority (MORUWASA). The main objective of the project is to improve and extend water supply and sewerage services in Morogoro Municipality to meet the demands of water and sewerage disposal up to the year 2035. The project is expected to improve the health of the local residents by improving/expanding the current water supply and sewerage services in Morogoro Municipality. In the long term, the project will improve the welfare of the local residents, hence contributing to the Government's efforts towards poverty alleviation in the country.

Justification and objective of the EIA study

The objective of carrying out the Environmental Impact Assessment was to assess social and environmental impacts (positive and negative) of the project for the construction and operation phases to determine its relevance and applicability to date. In addition, through further field visits, the impacts for construction works on the neighbouring population and environment as well as the impacts of additional volume of wastewater on the environment or increased water availability for the population was investigated. All the sites proposed for the project were visited and stakeholders consulted to gather their views and concerns as well as to identify and assess the magnitude of the impacts identified of the proposed project.

According to the Environmental Management Act No. 20 of 2004 and First Schedule made under Regulation 6 *(i) of the Environmental Impact Assessment (EIA) and Audit*

Regulation, 2005, the proposed development falls under the category of projects that require full EIA. Item 1 (ii) referring Water resources development projects (dams, water supply, flood control, irrigation, drainage), item 20 (a) (iii) referring construction of waste water treatment plant (off-site), as well as item 21 (v) referring water supply especially construction of water treatment plants. Thus, the proposed development requires full and mandatory EIA. In addition, the project should comply with several international requirements including the World Bank OP 4.01 on environmental assessment, 4.02 environmental action plan and 4.11 on physical cultural resources, the Equator Principles 1 to 10 and IFC Performance Standards.

Brief description of the project

The EIA study was conducted on the project components identified in the detailed design. All these components were reviewed and site visits were conducted. The components of the Project investigated include the following:

- Proposed increase in height for Mindu Dam to meet the water demand for the design horizon.
- Proposed expansion of Mafiga Treatment Plant to meet the forecasted demand.
- Expansion of relevant transmission mains to convey the water to be produced.
- Expansion of the water distribution network and storage capacity to be able to distribute the produced water to the customers.
- Expansion of the sewerage network to serve areas near existing facilities but not connected to the sewer system and to add sewerage network to new areas not connected to sewerage services.
- To add sewage treatment plant capacity (new waste stabilisation ponds) in order to treat the projected future sewage production for the new areas planned to be connected.

Missing Elements which were not included in the Detailed Design

The EIA study assessed also the missing elements which were not incorporated in the detailed design. Despite the fact that the expansion works were not envisaged in these components, protection works are necessary to preserve and sustain these resources and existing investments. These components are:

- **Industrial waste stabilization ponds at Kihonda.** This should be looked at as far as environmental safety is concerned. Rehabilitation ought to be carried out in order that they function effectively and discharge effluents that meet environmental standards.

- **Mambogo Water system**. The area around the intake is encroached by human activities and settlements. It is important that measures are undertaken to conserve the intake and protect it from contamination.
- **Vituli Intake**. This intake is encroached by residents and human activities risk polluting it. The intake thus needs protection to make it safe and sustainable in the long run.
- **Kigurunyembe and Kibwe Water Sources**: They are also encroached by human activities. They need protection as well.

Stakeholders and their involvement in the EIA process

Stakeholder consultations generated valuable views, concerns and suggestions on how best to improve the proposed project. Almost all the stakeholders highlighted the importance of the proposed project in socio-economic development of the Morogoro Municipality. The EIA team visited the project areas and consulted key stakeholders such as people living in the surrounding areas in the selected ten wards to be impacted by the project. Meetings were also scheduled and conducted with the Municipality, WAMI/RUVU Basin Authority, MORUWASA and TANESCO officials as well as Ward Executive officials and Councillors. Stakeholders' consultations were intended to identify issues of concern, project alternatives and to determine the boundaries of the project.

Results of Stakeholders' Consultations

Most stakeholders consulted supported the proposed water and sanitation project. The stakeholders' support is based on the grounds that the project will reduce the long-lasting problems caused by shortage of clean and safe water for domestic use as well as inadequate sanitation facilities in the Municipality. Key impacts pointed out by stakeholders includes the improvements to health of men, women and children as a result of improved water supply and sanitation, reduction in time spent collecting water, thus utilisation of saved time in other family activities and therefore improvement of quality of life, significant improvements in household income levels and thus improvement of economic status of the households, improvement of security of livelihoods due to limited travel times especially in the evenings in search of water, as well as increased school attendance resulting from better child care arising from improved water supply and sanitation. Stakeholders also expressed expected positive and negative impacts associated with the project (details of the key issues raised and noticed during the EIA Study (field work and interview with stakeholders are presented in the main report and in the Annex).

Potential Environmental Impacts Identified

The EIA study has identified both beneficial (positive) and adverse (negative) impacts of the proposed Project and has proposed appropriate mitigation measures of the identified negative impacts enhancement measures for the positive impacts. The sections below outline the enhancement measures for the positive impacts and mitigation measures for the negative impacts, respectively. Full impact assessment and analysis as well as development of mitigation and monitoring plan has also been done in this study.

Positive impacts and enhancement measures

The positive (beneficial) impacts associated with the project include:

- Creation of temporary employment during construction.
- Increase of income for local community, especially youth and women by selling food and other goods to construction workforce.
- Reduced incidence of water borne diseases due to improved safe water supply and sanitation conditions in the project areas.
- Reduced ground and surface water pollution as a result of improved sewerage system.
- Reduced dependence on pit latrines and septic tank systems on areas with high water table, hence reduce health hazards in the serviced areas
- Improvement of receiving water quality, hence providing better habitat for aquatic flora and fauna, as well as increase in beneficial use of receiving waters.

Enhancement measures

- Give employment priority to local people (men and women) during construction phase
- Offer project employment opportunities to men and women during operation, encourage women to apply and select candidates according to their competencies.
- Give preference to getting service from the local inputs (food, basic materials, etc.).
- Create enabling environment for food vendors through construction of temporary shelters with water supply and sanitary facilities.
- Intensify awareness and education campaigns on hygiene and sanitation practices among the local residents
- Promote household connections to sewerage system
- Encourage local residents in areas with high water table to connect to the sewerage system.

- Promote awareness campaigns among the local residents to discourage people from throwing non-degradable materials in flush toilets.
- Enforce legislation to discourage vandalism of water supply networks and sewerage system infrastructure.
- Use non-metallic covers for manholes and sewer chambers to discourage unscrupulous people looking for scrap metals.

Negative impacts and mitigation measures

The adverse (negative) impacts associated with the project will result from construction and operational activities. The potential negative impacts that are likely to occur from this project include:

(a) Possible Loss of land and properties due to construction of Waste Stabilization Ponds (WSP), Expansion of Water Treatment Plant and Construction of Storage Tanks
(b) Damage to road pavements and building structures due to excavation of water and sewer pipeline trenches.
(c) Disruption of public service utilities due to excavation of water and sewer pipeline trenches.
(d) Risk of possible ground and surface water pollution due to the seepage in WSP and overflow of raw sewage in WSP and overflow of raw sewage from manholes due to blockages of sewerage system.
(e) Air pollution due to emission of dust from soil excavations, stockpiling of soil materials and emission of exhaust fumes from heavy construction machinery/equipment and vehicles.
(f) Soil erosion and sedimentation of drainage systems due to excavation of water supply and sewer pipeline trenches and other earthworks.
(g) Disruption of traffic flow and increased risk of traffic accidents due to construction of water supply and sewer pipelines and movement of heavy trucks to and from the WSP.
(h) Creation of noise nuisance due to the use of noise creating equipment like jack hammers near residential areas.
(i) Construction related risks or accidents due to operation of heavy construction equipment/machinery.
(j) Creation of damage on WSP by toxic industrial effluents. Currently untreated industrial wastewater is discharged at Kihonda WSP and then disposed into Ngerengere River which passes near Kipera proposed area for WSP.
(k) Risk associated with raising height of Mindu Dam such as submergence of the main Morogoro – Iringa road as well as nearby settlements.
(l) Occupational health and safety risks due to operation of WSP by workers;

(m) Sedimentation and water pollution in the Mindu Dam due to cultivation activities on the upper catchments.

Mitigation measures

a) Survey and mapping of existing properties to ascertain the affected persons and properties
b) Identify pipelines route that are confined along existing roads or tracks
c) Pay compensation to the affected people. This should be done together with relocation of some affected infrastructures
d) Develop construction management plan before works implementation to avoid unnecessary crossings on roads, under building structures and storm water drainages
e) Design should focus on improving existing roads leading to construction sites within the right -of-way to minimise compensation and relocation.
f) Arrange coordination and mapping of all existing utilities between the Contractor and responsible authorities (e.g. TANESCO, TTCL, TANROADS etc.) prior to construction works to minimise service disruptions.
g) Develop emergency measures in consultation with the relevant authorities.
h) Ensure proper operation and maintenance of sewerage network and WSP.
i) Plant trees to create green belt as buffer zone around WSP to minimize visual impact. Preference should be given to indigenous trees with non-destructive good rooting system.
j) Assess direction of odour nuisance by running a simulation model based on wind direction to mitigate odour impacts to the communities/staff at the WSP.

Project Alternatives

Several project alternatives were assessed as follows:

No project alternative

The no project alternative entails retaining the current status quo without the improvement of water supply and sewerage services in Morogoro Municipality. Adopting this option would mean avoiding most of the negative effects associated with the establishment of the project and missing all the positive benefits and its impacts as outlined above.

Alternative roads and means of transport

The proposed project intends to utilize various raw materials including concrete, cement and sand in construction phase. These raw materials are expected to be transported to the area through well-established road networks- Morogoro to Iringa

road. There are other alternative roads (feeder roads) to access the project area in Mafiga, Kipera and Kingolwira.

Alternative technology

During construction (Mafiga treatment plant), alternative technology is proposed. Where necessary, the construction should use steel structure type where all the frames and major components including frame, floor steel, nuts doors and windows, sound proofing partitions are pre-fabricated overseas and assembled in Tanzania. This alternative technology can minimize the use of concrete-related materials i.e. bricks, gravel/stones, sand, cement which have environmental impacts to the surroundings.

Alternative Energy

The proposed development project intends to use electricity supplied by TANESCO. MORUWASA will meet the electricity cost used in operating the treatment plant and the proposed new plant at Mafiga. This will entail the developer to install the alternative source of energy such as solar power, gas, and standby generator to provide electricity in case of power shortage during construction and operation period.

Environmental and Social Monitoring Plan

Environmental and Social Monitoring Plan provided in the main document describe enhancement and mitigation measures that will form part of the management of the project. There are several components for monitoring that form an integral part of the proposed project, some of the issues discussed for monitoring relate to safety, hazards and risks, noise, air pollution, accidents while other issues relate to increase of employment and income to the surrounding community in the project area.

Cost and Benefit Analysis

The initial investment cost of the project is 30 Billion Tanzanian Shillings. Among other things, the initial investment cost is expected to cover the costs for construction, administrative overheads and marketing expenses. In addition to the direct project-related costs, there will be other cost for addressing environmental issues including cost of implementing mitigation measures to offset foreseen impacts as well as cost of implementing the project management plan.

Decommissioning

There is no time frame yet set for decommissioning of the proposed project. However, during decommissioning, rehabilitation of the project area to its original environmental status ought to be undertaken. Solid waste that will be generated from the demolition of the structure should be carted away for safe disposal in designated

areas. Indigenous species will be re-planted or left to geminate naturally to facilitate quick recovery of the areas.

Summary and Conclusion

The proposed development largely conforms to and supports various national policies and is expected to make significant contributions to the local community of Morogoro Municipality. The main recommendation therefore is that the proposed project for the improvement of water supply and sanitation services in Morogoro Municipality should be considered for development as it meets relevant policy objectives. However, negative impacts to the environment need to be mitigated as much as possible and positive impacts should be enhanced.

2.0 INTRODUCTION

2.1 BACKGROUND

Water as a natural resource is a vital commodity used for socio-economic development. Its availability or inadequacy both in quantity and quality has an impact on improving the standard of living of the population. Tanzania is endowed with abundant of water resources in the form of rivers, lakes, groundwater aquifers, ponds, reservoirs, and wetlands. The country is riparian to some of Africa's largest trans-boundary freshwater lakes including Lake Victoria, Lake Tanganyika and Lake Nyasa. Each of these water bodies exhibits unique characteristics and a complex range of water resources management and development issues and challenges.

Tanzania's annual renewable water resource is 89 km^3 and the annual average of available water per capita was 2000 m^3 in 2012 contrary to 2700 m^3 in the year 2001 (URT, 2014). This amount is projected to lessen by 30% corresponding to 1400 cubic meters per capita per year in 2025 as a result of diminution of water resources and increase of population.

Moreover, the distribution of water resource in the country is not uniform temporally and spatially causing unpredictable challenges to social and economic development planning in the country. This situation is coupled with climate variability, uncoordinated sectoral development plans, inadequate water security infrastructures, diminishing water resources, population growth with ever increasing socio-economic activities, catchment degradation, and water use conflicts. Also, rowing competition for national water resources threatens growth and plans for transformational development (URT, 2014).

Taking these issues into account, the Government of the United Republic of Tanzania (GoT) recognizes the need to develop institutions and methods capable for rapid expansion of water supply and sanitation services across the country. Accordingly, the Government has prepared a National Urban Water Supply and Sanitation Programme (NUWSSP) and developed a comprehensive plan to build water resource management capacity and to improve and extend water supplies. Part of this plan includes the improvement of water supply and sanitation services in Morogoro Municipality.

Implementation of the NUWSSP is part of the national effort to reduce poverty, and improve the health and quality of life of the urban population. It is purposely designed to enable the Government to achieve its National Five Years Development Plan targets and the country's SDGs. The Government recognizes the importance of universal access to improved Water Supply and Sanitation (WSS) and the need to

develop institutions and methods capable of rapid expansion of services across the country. The implementation of the NUWSSP has been designed for this rapid expansion.

This project therefore aims to improve and extend water supply and sewerage services in Morogoro Municipality to meet the demands of water and sewerage disposal up to the year 2035.

2.2 JUSTIFICATION OF THE PROJECT

Morogoro Municipal Council has the total population of 315,866 according to Census 2012. The Council is divided in two parts where the first part is in Urban with a total population of 251,521 while other part is in Peri urban area with a total population of 64,345. In Urban area 83% of its population has access to potable water while in Peri Urban areas only 31% of the population has access to potable water. Generally, only 73% of the population of the Council has access to potable water (URT, 2017).

Water supply to the distribution network is from two main sources, Mindu system and Mambogo system. Water from Mindu Dam gravitates to Mafiga Treatment plant after which it is pumped to Tumbaku reservoir. From there water gravitates to low areas of the distribution network whereas higher areas receive water from elevated tanks whose water is pumped from Tumbaku reservoir site. The Mindu/Mafiga system serves about 70% of the distribution network. Mambogo system serves the distribution system in the southern part of the Municipality. Other small sources serve small discrete areas within the network on the south-eastern part. For the Peri Urban areas, the main source of water is boreholes.

Water demand for Morogoro Municipality as at March 2017 was estimated to be 47,066m^3/day whereas installed water production was 34,000m^3/day according to MORUWASA records. During the month of May the amount of water produced was 11,686,695m^3 while the billed amount was 768,819m^3. The majority of the residents in Morogoro Municipality are in great need of safe and potable water and that there is a demand for an improved water supply (house connections, shared yard taps and public kiosks). The current supply is insufficient and irregular and cannot satisfy the needs of the Municipal population.

On the other hand, the common sanitation system used by the Municipal population is flushing toilets and septic tanks connected to soak away systems. Pit latrines are common in planned and unplanned areas due to the high cost of connection into sewerage system (currently 20% of connection material cost), low coverage of the sewerage system and non-availability of water supply.

Morogoro Municipality has central sewerage which serves a total population of 18,302 accounting for approximately 5.08% of the total Municipal population with a total length of 38 Kilometres, which include 10 kilometres of main sewer, and 28 kilometres of laterals.

The sewerage system covers only Central Business District (CBD) mainly Sabasaba, Mji Mkuu, Kingo, Boma and part of Mwembesongo, Mji Mpya, Mbuyuni and Mafiga Wards. The rest of the ward are not connected with the central sewerage system.

It has also 6 wastewater Stabilization ponds out of which 4 are maturation, one facultative and one anaerobic. The Authority has a total of 1,746 sewerage connections.

The Municipal Council owns two septic tanks emptying trucks each with a capacity of about 6,500 litres procured under URSP. However, the operating truck is only one with capacity of only eight trips per day. The waste water is normally disposed of at Mafisa Waste Stabilization Pond owned by MORUWASA. The availability of private emptying trucks has been found to contribute in minimizing direct discharge of waste water into Morogoro River and Kikundi stream. Therefore, this project is necessary to be implemented in the municipality.

The project is expected to increase access to clean and safe water to 95% of the population by the year 2035, increase production of water from 35,000 m^3/day to 126,000 m^3/day by the year 2035, improve water quality to meet the required standards, increase access to sewerage services from 5% to about 45% as well as provision of reliable and affordable water and sewerage services,

The project is expected to improve the health of the local residents by improving/expanding the current water supply and sewerage services in Morogoro Municipality. In the long term, the project will improve the welfare of the local residents, hence contributing to the government efforts towards poverty alleviation in the country.

2.3 OBJECTIVE OF AN ENVIRONMENT IMPACT ASSESSMENT

The aim of an Environmental Impact Assessment (EIA) is to ensure that the potential impacts on ecological, social, cultural, health and economic aspects as well as physical environment are foreseen and addressed during the project's planning and design, implementation and decommissioning stages. The EIA further identifies measures to mitigate or minimize the negative impacts, enhance positive ones and outlines ways to improve the project sustainability. The findings of the assessment are communicated to all stakeholders in the form of an Environmental Impact Statement Report. It is expected that the EIA will contribute to decision-making about

the project and shape it so that its benefits can be achieved and sustained without causing problems to the project areas.

2.4 OBJECTIVE OF THIS EIA

The nature and process of the project falls under type A projects as defined by Environmental Management Act No 20 (EMA) Cap 191 2004, Section 81(1), Item 6 of the Third Schedule. According to First Schedule made under Regulation 6 (i) of the Environmental Impact Assessment and Audit Regulation, 2005, the proposed development falls under the category of projects that require full EIA. *Item 1 (ii) referring Water resources development projects (dams, water supply, flood control, irrigation, drainage), item 20 (a) (iii) referring construction of waste water treatment plant (off-site), as well as item 21 (v) referring water supply especially construction of water treatment plants.* Thus, the proposed development requires full and mandatory ESIA. In addition, the project complies with several international requirements including the World Bank OP 4.01 on environmental assessment, 4.02 environmental action plan and 4.11 on physical cultural resources, the Equator Principles 1 to 10 and IFC Performance Standards.

The main objective of this EIA was to identify, predict and evaluate potential impacts of the proposed development and incorporate mitigation and/or enhancement measures into the designs, construction, operation and decommissioning processes of the project. The ultimate goal of EIA was to ensure the project sustainability with least negative impacts on the social, economic and ecological environment of the project areas. Specifically, the EIA considered among other things:

- Compatibility of project with relevant national and sectoral policies and legislations;
- Potential impacts of the project on the cultural and socio-economic environment of the surrounding communities and vice versa;
- Project alternatives including processing technology alternative, alternative use of energy, non-project alternatives etc;
- Costs and benefits of the project to the developer and local community;
- Potential impacts of the project on the surrounding biodiversity and vice versa;
- Potential impacts on ambient air, noise levels and water resources;
- Potential health hazards including spread of HIV/AIDS associated with the project;

- Mitigation options for negative impacts and enhancement options for positive ones, and
- Preparation of environmental management and monitoring issues related to the project.

2.5 THE STUDY METHODOLOGY

This EIA was undertaken in accordance and in compliance with Tanzanian National Environmental Laws. Thus, the study methodology involved literature review, stakeholder consultation and field survey. The assessment was conducted in phases with phase one constituting the scoping activities.

Scoping aimed at initial review of the potential environmental and social issues and their significance and the appraisal of the most appropriate techniques for impact prediction.

During the scoping stage, stakeholders were informed about the project and its likely effect and their views and concerns were gathered. Stakeholders' views and concerns helped to focus the study and to address project alternatives.

During the second phase (full EIA), a detailed assessment of the issues was done and anticipated impacts predicted and analysed and, mitigation measures to deal with the impacts were developed.

2.5.1 LITERATURE REVIEW

To supplement data gathered during the scoping and ESIA, a literature review was done to gather secondary data from reports on ecological, economic, financial and social issues related to the project area and the entire Morogoro Municipality. The literature review helped to obtain baseline information describing the project site and its surrounding areas.

The reviewed data included the current demographic characteristics of the area, socio-economic condition and activities, current ecological and geological condition, environmental condition and investment trend in the project area and the Municipality in general.

Other reviewed information included the current ambient, water and physical environment within the immediate impact area and areas of project influence. The baseline information will be useful during the monitoring of the project and its impacts in case of any changes following implementation of the project.

2.5.2 PROJECT BOUNDARIES

Project boundaries i.e. spatial, temporal and institutional dimensions of the project were determined.

Spatial boundaries relate to a consideration of the extent to which the proposed project will impact on the surrounding environment and to the way the environment is likely to impact on the project activities. Thus, spatial boundaries were considered in terms of the core impact area, the immediate impact area and area of influence.

The core impact area constitutes the area that will be immediately and directly be affected by the actions undertaken during the project implementation, this includes all the areas covering the project and area where other associated infrastructure (e.g., transmission lines and storage facility) will be constructed.

The immediate impact area will comprise of areas outside the core zone where human or natural activities are likely to impact directly on or be impacted by the activities taking place in the core area.

In the proposed project, the immediate impact area will include the existing settlements around Mindu dam, farms, mixed commercial and residential houses (around CBD and Kingolwira) and other associated infrastructures such as roads etc. The immediate impact zone is determined on the basis of the following factors:

- The distance of travel of noise, dust and exhaust fumes from movement of machines and equipment during mobilization and construction activities (in those areas where construction will take place),
- The areas workers and guests are likely to visit while working on the project area and
- The potential applicability of the area for use in other activities directly or indirectly related to the building e.g. source of water for the facility, potential road for transporting equipment and other products.

The area of influence refers to the greater area that is not subject to direct contact with the project but is directly or indirectly affected by or affecting the project. This includes activities taking place outside of the geographical core area and area of immediate impact, but will still have influence on the project or vice versa. They include sources of industrial construction materials and equipment, sources of cement production and concreate materials, as well as construction experts (construction engineers) and decision-making centres (Morogoro Municipality, MORUWASA, Ministries, NEMC, etc.).

2.5.3 Consideration of Project Alternatives

Possible alternatives that were assessed include: alternative technology, roads and means of transport, alternative energy sources, and the “no project” alternative.

2.5.4 Stakeholder Involvement

Stakeholders here refer to all those people and institutions with interest in the successful design, construction, implementation and sustainability of the project. The stakeholders that were considered included those affected positively and negatively by the project. They included local communities living around the project area, formal organizations and public/community organizations and groups, local leaders, central government officials, private sector etc.

Methods for stakeholder participation included public meetings and individual consultations/interviews. Stakeholders were consulted so as to inform them about the EIA study and the proposed project. Meetings were conducted in Kilakala, Kihonda, Kingolwira, Mindu, Mafiga, Mwembesongo, Mlimani, Boma, Mafisa and Sabasaba Wards in Morogoro Municipality. Other stakeholders from different institutions like TANESCO, Mzinga, Mafiga Water Treatment Plant, Basin offices, MORUWASA were consulted.

2.5.5 Impact Assessment

The impacts of the proposed development were identified drawing from the preliminary EIA (or scoping report) and updating the checklist accordingly. Impact prediction or estimation of the magnitude, extent or duration of the impacts was done in comparison with the situation without the project or action.

The initial baseline condition prior to project implementation provides the basis for forecasting the future scenario with or without the project and compares the changes with relevant national and sectoral laws and regulations while taking cognizance of stakeholder views and concerns. The approach to impact prediction was to give ratings (quantification) for each identified potential impact and producing a correlation matrix. In the matrix, ratings ranged from 0 to +2 for positive impacts and from 0 to –2 for negative ones, where:

- +2 - High Positive Impact
- +1 - Minor Positive Impact
- 0 - No Impact
- -1 - Minor Negative Impact
- -2 - High Negative Impact

3.0 DESCRIPTION OF THE PROJECT AND LOCAL ENVIRONMENT

3.1 THE LOCATION OF THE PROJECT

The proposed project is located in Morogoro Municipality covering 29 wards. The project expects that water supply and sanitation improvements will have an overall positive impact to the whole of the Municipality.

3.2 NATURE OF THE PROJECT AND ITS COMPONENTS

The proposed project involves the improvement of water supply and sewerage services in Morogoro Municipality. The EIA study was conducted on the project components identified in the detailed design by AAW Consultants and subsequent reviews by the current Consultancy. All these components were assessed and site visits were conducted. The components of the Project investigated include the following:

3.3 WATER SUPPLY SERVICES

- Extension of existing DN700 pipeline to Mindu Dam.
- Installation of additional DN600 pipeline from Mindu Dam to Mafiga Treatment Plant.
- Installation of DN400 and DN300 pumping main from Tumbaku to Kingolwira
- Construction of 450m^3 Kingolwira elevated tank.
- Replacement of 185km old and dilapidated water distribution pipes.
- Expansion of Mafiga Water Treatment Plant by 81,000m^3/day to ensure total treatment capacity of 108,000m^3/day.
- Implementation of modern, adequate and efficient pumps at Mafiga Treatment Plant to meet the ultimate capacity of 108,000m^3/day.
- Implementation of modern, adequate and efficient pumps at Tumbaku pump station to meet expected 2035 demands.
- Implementation of the proposed additional distribution tanks and water distribution network to cover the ultimate water demand requirements.

3.4 SEWERAGE AND WASTEWATER SERVICES

- Extension of sewer network by 50km to areas that can be connected by gravity to the existing network and system.
- Construction of new sewer network in Kihonda and other surrounding areas that can drain their sewage by gravity to the proposed new ponds.

- Construction of 25,000m^3/day new waste stabilization ponds at the new proposed site to cover demand for all areas that can drain to it by gravity.

  The proposed area is full of settlements and all key services such as electricity, water supply and access roads are available. To continue with the proposed plan will require a resettlement action plan to relocate the people and compensate them to settle in other areas which is an additional cost to the project. The best option would be to earmark a new area/plots for constructing the proposed wastewater stabilization ponds. The new area at Kipera is proposed for construction of the ponds. The site selection criteria for the Wastewater Stabilization Ponds were; elimination of pumping needs, shortest sewers routes, and lowest level possible area.
- Rehabilitation of existing Mafisa ponds (mostly desludging works) to ensure that the treatment process is efficient and effluent eventually released to the receiving river meets required standards.
- Construction of incinerator to improve the hygiene of the environment around Mafisa Waste stabilization ponds and in the proposed new ponds site.
- Proposed construction of Wastewater Stabilization Ponds at Kihonda area.

3.5 INCREASING CAPACITY OF MINDU DAM RESERVOIR

Mindu Dam is located on the Ngerengere River, about 7km Southwest of Morogoro town. Figure 2.1 shows a regional satellite image for Mindu Dam and its catchments, with a total area of about 300 Square Kilometres (Km^2). Figure 2.2 shows a satellite image of Mindu Dam Lake.

This component involves raising the existing dam embankment from the current level of 507 masl by 2.5 metres to 509 masl. Raising of the dam embankment will increase the dam capacity to enable expansion of Mafiga treatment plant as planned.

However, the main sources of water (catchment areas) of Mindu Dam are encroached by settlements and agriculture activities. Therefore, restoration of these water sources (catchment areas) and proper management are necessary to enhance benefits of raising the dam. Negative Impacts on the settlements around and on the main road of Morogoro to Iringa as a result of Raising Mindu Dam need to be fully investigated and mitigated in the design review stage prior to construction.

Figure 1: Regional satellite image for Mindu Dam and its catchments

Figure 2: Satellite image of Mindu Dam Lake.

3.6 MISSING ELEMENTS WHICH WERE NOT INCLUDED IN THE DETAILED DESIGN

The EIA study also assessed the missing elements which were not incorporated in the detailed design. Despite the fact that the expansion works were not envisaged in these components, protection works are necessary to preserve and sustain these resources and existing investments. These components are:

- **Industrial waste stabilization ponds at Kihonda.** The existing industrial waste stabilization ponds at Kihonda are not mentioned in the proposed project and they are in very bad condition. The ponds are not maintained and the untreated smelling effluents are passing through residential areas into River Ngerengere. Immediate action such as rehabilitation of the ponds is required to save the environment, the people and living organisms depending on River Ngerengere. This should be looked at as far as environmental safety is concerned. Rehabilitation ought to be carried out in order that they function effectively and discharge effluents that meet environmental standards

- **Mambogo Water system**. The area around the intake is encroached by human activities and settlements. It is important that measures are undertaken to conserve the intake and protect it from contamination.

- **Vituli Intake**. This intake is encroached by residents and human activities risk polluting it. The intake thus needs protection and fence to make it safe and sustainable in the long run.

3.7 PROJECT ACTIVITIES

3.7.1 MOBILIZATION

Mobilization phase of the project will constitute mobilization of human resources, equipment, construction materials for the plant, storage site and site preparation. The topography and geology of the area will determine some of the extent of activities during the mobilization phase.

Additionally, the mobilization phase will involve site preparation that entails clearing ground for constructing the treatment plant and the ponds, transmission lines and storage tank areas. Further, mobilization will include gathering materials for construction and other facilities related to project operation.

3.7.2 CONSTRUCTION PHASE

During this phase, the main activity will involve construction of the proposed infrastructures and other associated setups such as the water and wastewater management infrastructure and all other facilities associated with the project.

Labour force and equipment required

There will be a number of professionals from the construction industry led by the Project Manager. Other professionals will include Dams Expert, Water Supply Design Engineer, Sanitation Design Engineer, Resident Engineer(s), Water and Waste Water Treatment Expert, Electromechanical Engineer, Structural Engineer, Engineering

Surveyor, Sociologist and Environmentalist. Also, there will be unskilled labour to prepare the transmission lines and others to work with the artisans.

Apart from the labour force, there will be a number of machinery such as lifts, cranes, forklifts, and all sorts of construction equipment. Also, trucks will be used to transport construction materials to the sites. Proposed construction hours are 8am to 5pm, seven days per week, however the contract may propose otherwise.

Raw Material Acquisition

Most of the raw materials to be used will be sourced locally. These materials include bricks, gravel/stones, sand, floor steels/iron, frames, wood, and cement.

3.7.3 OPERATION PHASE

The activities during the operation phase will include a wide range of water transmission, treatment and storage facilities/accessories ready to be supplied to various beneficiaries within the municipality. Other activities will include waste management, maintenance, landscaping and planting some vegetation to control erosion in the project affected areas.

3.7.4 DECOMMISSIONING PHASE

It is envisaged that the project will be operational for a number of decades. In case the development comes to an end, decommissioning of the facility will be undertaken in accordance with the laws and regulations that will be prevalent at the time. This phase will mainly involve demolition of the structures and other associated infrastructures.

A written plan detailing how construction related equipment, materials and wastes will be decommissioned and disposed of on completion of their use will be prepared. The decommissioning and disposal plan will be reviewed by the project proponent prior to mobilization of the contractor to the site, and the proponent will maintain ultimate responsibility for the proper management of equipment, materials and wastes within the project area.

Prior to demobilization, the contractor will prepare a detailed list of all remaining equipment, unused materials, and wastes transported to the project area or generated as a result of work they performed. The equipment, unused materials and waste list will contain a description of the following:

- How each piece of equipment will be prepared for off-site shipment and the type and quantity of waste materials that will be generated during the equipment demobilization effort;

- The quantities and types of all unused materials, and the planned disposition of those materials; and
- The types, quantities and disposal plan for all wastes generated by the contractor which still remain within the project area.

The equipment, unused materials and waste list will be submitted to the proponent prior to demobilization of the Contractor to ensure that all equipment, unused materials and wastes are managed and disposed of in accordance with good practices, applicable regulatory requirements, and the procedures.

3.8 SOURCE OF ENERGY

The proposed new plant will use electricity from TANESCO. The existing plant is already connected to the national grid. The standby generator is recommended to be installed and operated during power shortages. The possibility to use solar energy system for lightening and other minor operation is strongly recommended.

3.9 WASTE MANAGEMENT

3.9.1 SOLID WASTE GENERATION AND MANAGEMENT

The project will generate waste during the construction phase. Some of the solid wastes which are likely to be generated by the project will include waste rocks/sands, dust, as well as remains of construction materials like timber, cement and steel used during the construction. Solid wastes will have to be dumped in a designated area, which will be designed to contain the waste from leakage and contaminated soils.

Other solid wastes are expected to be generated from the workers' camps during construction and from residential/commercial and industrial areas during the operation phases.

These will include garbage, redundant raw materials, bottles and containers that need to be disposed of. Dust bins and collection points will be provided to cater for these different types of wastes that are generated from staff house and workers camp. Waste collected from dust bins will be sorted at the main collection point where a prescribed agent/service provider will collect the waste to dispose it in the designated sites as located by the Municipality. It is highly recommended that waste separation as well as decomposition of organic waste and recycling of solid waste be practiced.

3.9.2 LIQUID WASTE

During the construction and operation phases of the project, the anticipated liquid waste from the project will consist of domestic grey water emanating from residential

areas, workers camps, and offices. New sewerage systems to be constructed should consider extending the service to those areas with no sewerage services as well as in the treatment plant to cater for workers' camp, and staff offices. The existing industrial waste stabilization ponds at Kihonda should be rehabilitated in order that they function effectively and discharge industrial effluents that meet environmental standards.

Due to the reallocation costs, Kihonda was abandoned as a residential Waste Stabilization Pond site and instead Kipera was suggested to be suitable for the construction of the Waste Stabilization Pond. During full EIA MORUWASA had commenced the seeking of permissions from the Municipality for construction of the proposed new ponds at Kipera site beside Ngerengere River. This will also involve public/stakeholder's awareness creation of the construction works.

3.10 MUNICIPAL WATER MANAGEMENT

Morogoro Municipality receives water from different water sources, e.g. Mindu Dam, Mambogo Intake, Vituli river, boreholes etc. Water quality of these sources is being monitored on a regular basis by the Mafiga water treatment and Wami/Ruvu Basin laboratories. The Faecal coliform, Total coliform, Total hardness, pH Turbidity, Colour, Magnesium, Nitrate, Iron, Phosphate, Total chlorine are among the parameters monitored. The raw water is treated for these parameters to fall within WHO acceptable standards before distribution is done.

4.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 POLICY FRAMEWORK

4.1.1 NATIONAL ENVIRONMENT POLICY (NEP, 1997)

The National Environment Policy (NEP, 1997) is the main policy document governing environmental management in the country. The policy addresses environmental issues of both natural and social concerns, and adopts the key principle of sustainable development. The policy has also proposed a framework for environmental legislation to take account of the numerous agencies of the Government involved in regulating the various sectors. Thus, the policy provides strategic plans on environmental management at all levels. It provides the approach for mainstreaming environmental issues for decision-making and defining sectoral policy action plans.

In terms of environmental management and protection, the policy identifies six key problem areas namely:

- Land degradation;
- Lack of access to good quality water;
- Environmental pollution;
- Loss of wildlife habitat and biodiversity;
- Deterioration of aquatic ecosystems and
- Deforestation.

The policy requires EIA to be mandatory for all development projects likely to have significant environmental impacts. The intention is to ensure that the development projects are implemented in an economically sustainable manner while safeguarding environmental and social issues for the benefit of the present and future generations.

Relevance to the Project

The policy is relevant to the project because the project addresses lack of access to good quality water as one of the key environmental problems in the country as stipulated in the policy document. The policy is also relevant to the project because the project is likely to cause some negative environmental impacts and therefore according to the policy the project should be subject to an EIA study. In general, the project will be required to address environmental policy objectives by ensuring that environmental degradation is minimized.

4.1.2 NATIONAL WATER POLICY (NAWAPO)

Tanzania has been undertaking various water sector reforms in order to address emerging challenges in water resources development and management. The major reforms undertaken include;

- The National Rural Water Supply Programme (1985)
- The First National Water Policy (1991)
- The Water Sector Review (1993)
- The Rapid Water Resources Assessment (1994), and
- The River Basin Management and Small Holder Irrigation Improvement Project, which amongst others revised the 1991 policy to a new National Water Policy (NAWAPO) as approved by the cabinet in July 2002.

The objectives of the NAWAPO are:

- To develop a comprehensive framework for sustainable development and management of the nation's water resources, putting in place an effective legal and institutional framework for its implementation.
- To ensure that beneficiaries participate fully in planning, construction, operation, maintenance and management of community-based domestic water supply schemes.
- To address cross-sectoral interests in water, watershed management and integrated and participatory approaches for water resources planning, development and management.
- To lay a foundation for sustainable development and management of water resources in the changing role of the government from service provider to that of coordination, policy and guideline formulation and regulation.

The NAWAPO 2002 in allocating water for different uses, water for basic human needs in adequate quantity and acceptable quality receives highest priority. Sufficient water to protect the ecosystems that underpin Tanzania's water resources now and in the future, will attain second priority; this water will be reserved for the environment. Other uses will be subject to social and economic criteria, which will be reviewed from time to time.

Relevance to the Project

The project management will be required to ensure that water abstraction takes into consideration downstream water flow for environmental purposes and protection of ecosystems.

4.1.3 National Water Sector Development Strategy (NWSDS 2004)

The National Water Sector Development Strategy (NWSDS 2004) has been formulated as guideline in implementing the NAWAPO (2002) and it describes the institutional and legislative framework for its implementation.

The NWSDS considers water as a shared common resource as it touches a wide range of economic development sectors. Thus, the NWSDS considers water related aspects of other sectoral policies in order to provide guidance on priority areas for inter-sectoral development planning.

The NWSDS recognizes the role of water in poverty alleviation. According to the NWSDS, the impact of low water supply falls primarily on the poor people. In this case, Water Sector is included among the priority sectors in the National Poverty Reduction Strategy Paper (PRSP).

The strategy also, recognizes the important role played by NGOs and CBOs as service providers and the importance of community ownership and management of water resources. This includes equal gender representation in village water committees. The water strategy is gender sensitive as it calls for involvement of women and men in decision-making related to water resource development and management or provision of water and sanitation services.

Relevance to the Project

The project addresses the problem of inadequate and good quality water supply and provision of sanitation services in the urban area. The project will be required to address gender issues by ensuring involvement of women and men in decision-making related to provision of water and sanitation services.

4.1.4 National Human Settlements Development Policy (2000)

The overall objective of the National Human Settlements Development Policy (NHSDP) is to promote the development of sustainable human settlement and to facilitate the provision of adequate and affordable shelter to all people, including the poor. The NHSD policy outlines a number of objectives including environmental protection within human settlements and protection of natural ecosystems against pollution, degradation and destruction.

The NHSDP recognizes planning and management of human settlement areas as one of the broad human settlement issues. Within this regard, the NHSDP identifies environmental protection as one of the strategic issues in human settlement planning and development. NHSDP also addresses the following issues:

i. Lack of solid and liquid waste management, leading to environmental deterioration;
ii. Emission of noxious gases from vehicles and industrial activities as a major cause of air pollution in urban areas;
iii. Encroachment into fragile and hazardous lands (river valleys, steep slopes and marshlands) leading to land degradation, pollution of water sources, etc.;
iv. Increasing dependence on firewood and charcoal as a main source of energy in human settlements leading to depletion of forest, environmental deterioration and air pollution; and
v. Un-authorized sand mining in river valleys leading to environmental degradation.

Relevance to the Project

MORUWASA project will be confined with Morogoro Municipality settlement pattern and upcoming Master Plan. Thus, the project might cause an increase of human settlements in the area, increased consumption of water facilities as well as waste generation. The EIA study will also address the unplanned settlements in the catchment areas and water intake points. The impacts of these settlements will be assessed and mitigation measures will be proposed.

4.1.5 WATER SECTOR DEVELOPMENT PROGRAMME (WSDP)

The Ministry of Water and Irrigation is implementing the Water Sector Development Programme (WSDP), for the period 2006–2025. The programme has four components, namely: (i) Water Resources Management; (ii) Rural Water Supply and Sanitation; (iii) Urban Water Supply and Sewerage; and (iv) Institutional Development and Capacity Building. It follows a Sector Wide Approach to Planning (SWAP); with an overall objective of strengthening sector institutions for integrated water resources management and improve access to water supply and sanitation services.

The objective is to attain the aspirations of the National Development Vision 2025; which envisions universal access to water supply services in urban areas by 2025; and covering at least 90% of the population with water supply services in the rural areas by 2025; while ensuring environmental sustainability through integrated water resources management principles. Implementation of the Programme is done throughout the country in all Local Government Authorities (LGAs), Basin Water Boards (BWBs), and Urban Water Supply and Sanitation Authorities (UWSAs).

Relevance to the Project

Water Sector Development Programme second phase is in the course of implementation and has five key components which are relevant to Sustainable Development Goals especially goal 6. These includes Water Resources Management; Rural Water Supply and Sanitation; Urban Water Supply and

Sanitation; Sanitation and Hygiene; as well as Programme Delivery Support. Therefore, this project is part and parcel of the implementation of WSDP II focusing on component number two to improve urban water supply and sewerage in Morogoro town.

4.1.6 THE NATIONAL FIVE YEARS DEVELOPMENT PLAN 2016/17-2020/21

The Second Five Year Development Plan (FYDP II), 2016/17– 2020/21, has integrated frameworks of the first Five Year Development Plan (FYDP I, 2011/2012-2015/2016) and the National Strategy for Growth and Reduction of Poverty (NSGRP/MKUKUTA II, 2010/2011-2014/2015) further extended to 2015/2016). This integration implemented a Government decision taken in 2015 to merge the two frameworks. The objectives of integrating the two frameworks were to improve efficiency and effectiveness in implementation through organizing and rationalizing national resources under one framework, by addressing critical challenges, which beset implementation of the parallel frameworks.

The theme of FYDP II "Nurturing Industrialization for Economic Transformation and Human Development" incorporates the main focus of the two frameworks, namely growth and transformation (FYDP I) and poverty reduction (MKUKUTA II). FYDP II outlines new interventions to enable Tanzania industrialize in a way that will transform its economy and its society. It also incorporates unfinished interventions from the predecessor Plan and Strategy, respectively, deemed critical for realization of the aspirations of FYDP II. More importantly, and in tandem with the two predecessor frameworks, FYDP II also implements aspects of Tanzania's Development Vision (TDV) 2025 which aspires to have Tanzania transformed into a middle income and semi industrialized nation by 2025, characterized by the year 2025: (i) high quality and sustainable livelihoods; (ii) peace, stability and unity; (iii) good governance and the rule of law; (iv) an educated and learning society; and (v) a strong and competitive economy.

The main objective of the FYDP II is to build a base for transforming Tanzania into a semi-industrialized nation by 2025 as well as accelerate broad-based and inclusive economic growth that reduces poverty substantially and allows shared benefits among the majority of the people through increased productive capacities and job creation especially for the youth and disadvantaged groups.

Relevance to the Project

The plan recognizes the importance of water sector in realizing its intended objectives. The FYDP prioritize water subsector and four components have been covered including Urban Water Supply Strategic Choices. These include Water

supply improvement in National projects, District headquarters and small towns, as well as improvement of water supply and sanitation services in Regional Centres.

4.1.7 THE TANZANIA DEVELOPMENT VISION 2025

Composite Development Goal for the Tanzania Development Vision 2025 foresees the alleviation of poverty through improved socio-economic opportunities, good governance, transparency and improved public-sector performance. The objectives of the Tanzania Development Vision are not focused on economic issues only, but also highlights on how to tackle social challenges such as education, health, the environment while increasing involvement of the people in working for their own sustainable development.

Moreover, the Tanzania Development Vision 2025 seeks to mobilize the people; the private sector and public resources towards achieving shared goals and achieve sustainable semi-industrialized middle market economy by year 2025. The development of the construction material production factory aims at increasing the availability of concrete materials and increase employment opportunities among other benefits.

Other policies that are relevant to the proposed development, and which may have direct or indirect implications include (a) The National Transport Policy of 2011, (b) National Health Policy of 2003, (c) Women and Gender Development Policy of 2000, (d) The National Investment Policy, (g) National Trade Policy of 2003 and (h) National Construction and Industry Policy, 2003. During the full EIA, impacts arising from the proposed development that may have implications to these policies and several others will be highlighted.

Relevance to the Project

This project contributes in the implementation of the water supply and sanitation by improving and extending water supply and sewerage services in Morogoro Municipality to meet the demands of water and sewerage disposal for the coming 25 years.

4.2 LEGAL FRAMEWORK

4.2.1 THE CONSTITUTION OF TANZANIA (1977)

The Constitution of the United Republic of Tanzania recognizes the basic rights for its people as outlined in Part III section 14 and 24 (Act No. 15 of 1984). Section 14 states that every person has the right to life - that every person has the right to live and to the protection of his/her life by the society in accordance with the law.

Section 24 stipulates that every person is entitled to own property and has a right to the protection of his property held in accordance with the law. However, there are

certain limitations upon enforcement and preservation of basic rights, freedom and duties as stipulated in the Act No. 15 of 1984 Section 6 and Act No. 34 of 1994.

Section 30(2)- has the provision that contain in the constitution, which states that "freedom and duties do not invalidate existing legislation or prohibit the enactment of any legislation or the doing of any lawful act in accordance with such legislation for the purpose of - among others-ensuring the defence, public safety, public order, public morality, public health, rural and urban development and utilization of minerals or the increase and development of property or any other interest for the purpose of enhancing the public benefit".

Relevance to the Project

The national constitution must be observed by project proponent, especially in matters concerning human rights as stipulated in the constitution. This should be the case because the project may lead to land acquisition and loss of private properties. Under such circumstances the project proponent would be required to execute compensation or resettlement according to the country laws.

4.2.2 Environmental Management Act No 20 of 2004

The Environmental Management Act No. 20 of 2004 is the principle legislation governing environmental management in the country. The Act recognizes the right of every citizen to clean, safe and heath environment, and the right of access to environmental resources for recreational, educational, health, spiritual, cultural and economic purposes. Thus, the Act provides a legal framework for coordinating harmonious and conflicting activities by integrating those activities into overall sustainable environmental management system by providing key technical support to Sectoral Ministries.

For effective implementation of the national environmental policy objectives the Act has identified and outlined specific roles, responsibilities and functions of various key players and provides a comprehensive administrative and institutional arrangement, comprised of:

- National Advisory Committee
- Minister Responsible for Environment
- Director of Environment
- National Environmental Management Council (NEMC)
- Sector Ministries
- Regional Secretariat
- Local Government Authorities (City, Municipal, District and Town Councils

Part VI Sub-section 81(1) of the Act requires a project proponent or developer of a project to undertake Environmental Impact Assessment (EIA) at his I her own cost prior to commencement or financing of the project or undertaking. The types of projects requiring EIA are listed in the THIRD SCHEDULE of the Act. Thus, in that regard the Act prohibits any development to be initiated without an Environmental Impact Assessment (EIA) Certificate.

Sub-section 86(1) stipulates…" the Council shall upon examination of a project brief, require the proponent of a project or undertaking to carry out an Environmental Impact Assessment study and prepare an Environmental Impact Statement". According to Sub-sections 1-4 of the Act the EIS should be submitted to the Council, which carries out a review through its Technical Review Committee (TRC). The Council is also required to make a site visit during the review process for inspection and verification at the Project Proponent's cost.

Relevance to the Project

The Act is relevant to the project because the project is expected to have some negative impacts to the environment. Thus, the project is listed in the THIRD SCHEDULE of the Act and falls under those project that require Environmental Impact Assessment (EIA) study before its commencement. The EIA report must be submitted to NEMC for review and subsequently issuance of Environmental Impact Assessment Certificate.

4.2.3 THE WATER RESOURCE MANAGEMENT ACT (2009)

The Water Resource Management Act No. 11 of 2009 was enacted to provide for institutional and legal framework for sustainable management and development of water resources; to outline principles for water resource management; to provide for the prevention and control of water pollution; to provide for participation of stakeholders and general public in implementation of the National Water Policy, repeal of the Water Utilization (Control and Regulation) Act Cap. 331 of 2002 and to provide for related matters.

The objective of this Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account fundamental principles.

Section 5 outlines the principles of sustainable water resource management. It states that any persons exercising jurisdiction under this Act shall, in relation to any decision, order, exercise of any power or performance of any function, be guided by the following principles of sustainable integrated water resource management and sustainable development:

(a) The precautionary principle;

(b) Polluter pay principle;
(c) The principle of eco-system integrity;
(d) The principle of public participation in the development policies, plans and process for the management of the water resources;
(e) The principles of international co-operation in management of environmental resources shared by two or more states; and
(f) The principle of common but differentiated responsibilities.

Sub-Section 6(1) requires any person exercising powers under this Act or under any other written law having a bearing on the provision of water resource management to promote and have regard to National Water Policy, 2002, in respect of water resource management.

According to Sub-section 6(2) the preference to water allocation shall be for domestic purposes; environmental resource; and socio-economic activities, depending on the availability of water resources

Section 8 requires the Director of Water Resources to carry out Strategic Environmental Assessment where major water project is planned in accordance with the procedures and regulations made under the Environmental Management Act Cap.191 of 2004.

Section 9 requires Environmental Impact Assessment to be carried out for any proposed development in a water resource area or watershed to which this Act applies, whether that development is proposed by or is to be implemented by a person or organization in the public or private sector in accordance with the provisions of the Environmental Management Act Cap 191 of 2004.

Section 12 deals with right to rainwater harvesting or use of recycled water, whereby Sub- section 12(1) allows the owner or occupier of any land to construct any works for rainwater harvesting or for recycling of used water other than in a river or stream and abstract and use the water so conserved or recycled for domestic purposes without a Water Use Permit issued under this Act. Sub-section 12(2) states that notwithstanding the generality of sub-section (1), no works for purpose of rainwater harvesting shall have the capacity greater than the capacity prescribed in regulations by the Minister.

Section 54 deals with application for groundwater permit, whereby it requires any person who intends to construct, sink, enlarge or deepen a well or borehole in a Groundwater Controlled Area declared under Section 38 or any other area to apply for a Groundwater Permit

Part X of the Act deals with dam safety and flood management, whereby Section 86 gives interpretations as applied to the dam safety and flood management. The

section defines a "dam" as any existing or proposed structure which is capable of containing, storing or impounding water, including temporary impoundment or storage, whether that water contains any substance or not.

The section also defines a "dam with a safety risk" as any dam which can contain, store or dam more than 50,000 cubic metres of water, whether that water contains any substance or not, and which has a wall of a vertical height of more than five metres, measured as the vertical difference between the lowest downstream ground elevation on the outside of the dam wall and the non-overspill crest level or the general top level of the dam wall.

Section 90(1) requires the owner of a dam with or without safety risk to register the dam. Sub-section 90(2) specifies that an application for registration of a dam shall be made within one hundred and twenty days:

- After, the date on which the dam becomes capable of containing, storing or impounding water;
- After, the date on which an already completed dam is declared to be a dam or
- After, publication of a notice declaring a category of dams to be dams with safety risk as the case may be.

Section 93 requires the dam owners to make review of dam facilities. Sub-Section 93(1) state that the owner of the dam with or without safety risk shall carry out the comprehensive facility review after every five years. Sub-section 93(2) states that where an earthquake or land slide has occurred proximate to a dam, the owner of the dam shall carry out a periodic review of the dam. Sub-section 93(3) requires the owner of the dam to submit a report to the Director of Water Resource, who shall issue directives to the owner of the dam on remedial measures to be taken to remedy any risk.

Relevance to the Project

In general, the project deals with water resource development and therefore the project proponent has to adhere to all provisions given under this Act. Specifically, the project involves groundwater abstraction, rainwater harvesting and dam construction. In this regard, the project proponent has to adhere to the provisions of Section 12 for rainwater harvesting; Section 54 for groundwater abstraction and Section 93 for dam construction.

4.2.4 WATER SUPPLY AND SANITATION ACT NO. 12 OF 2009

Was enacted to provide for sustainable management and adequate operation and transparent regulation of water supply and sanitation services with a view to give effect to the National Water Policy, 2002; to provide for establishment of water supply and sanitation authorities as well as community owned water supply organizations; to

provide for appointment of service providers, repeal of the Waterworks Act and to provide for related matters.

According to Sub-Section 4(1) the objective of the Act is to promote and ensure the right of every person in Tanzania to have access to efficient, effective and sustainable water supply and sanitation services for all purposes by taking into account the 10 fundamental principles of sustainable water supply and sanitation. One the fundamental principle is protection and conservation of water resource and development and promotion of public health and sanitation. Sub-Section 4(2) requires all persons exercising powers under this Act or under any written law having a bearing on the provision of water supply and sanitation services to promote and have regard to the National Water Policy, 2002, in respect of urban water supply and sanitation and rural water supply.

Part IV provides for establishment of Water Supply and Sanitation Authorities. Sub-section 9(1) requires the Minister in consultation with the Minister responsible for local government authority to announce in the Gazette the establishment of water authority and cluster water authorities to achieve commercial viability. Sub-section 9(2) specifies the service area of water authorities. The section states..."the service areas of water authority established pursuant to sub-section (1) may include the administrative boundaries of one or more local government authorities as may be determined in accordance with this Act or other written laws for the most efficient and economical provision of water supply and sanitation services".

Sub-Section 21(1) specifies powers and duties of water supply and sanitation authority, whereby one of the powers is to have a way leave to enter into any for the purpose of laying water mains or sewers, or erecting a public tap. Sub-Section 21(2) gives powers the water authority or service provider to assume control over the way leave in any land acquired in accordance with Sub-Section 21(1). It gives powers to water authority or service provider to assume control over ten metres such land being 5 metres from the edge of each side of the main pipe and 4 metres being 2 metres from the edge of each side of secondary pipe and 1 metre being half a metre from the edge of each side of tertiary pipe. And no person shall be permitted to enter and stay or do anything upon that land without permission of the water authority or service provider, as the case may be.

Sub-Section 22(1), deals with service provision to economically disadvantaged persons. It requires a water authority during discharge of its duties under Section 21 to take into account the existence and needs of the economically disadvantaged persons when:

(a) Supplying water and sanitation services to these persons;

(b) Setting tariffs and other charges for water supply and sanitation services; and

(c) Taking any action in any matter likely to have a negative effect on the economic wellbeing of such groups. Sub-section 22(2) requires a water authority to identify economically disadvantaged persons in collaboration with the local government authority.

Relevance to the Project

Sub-section 9(1) of the Act is relevant to the project because the project is being implemented by MORUWASA, which deals with provision of water supply and sanitation services. Sub- Section 21(2) is also relevant to the project because it will involve acquisition of way leaves for water supply and sewer pipelines. MORUWASA shall be required to adhere to and take into account the needs of the disadvantaged groups when providing water supply and sanitation services as specified in Sub-section 22(1).

4.2.5 The Energy and Water Utilities Regulatory Authority Act (2001)

The Energy and Water Utilities and Regulatory Authority Act No. 11 of 2001 established the Energy and Water Utilities Regulatory Authority (EWURA). According to Section 6 the duties of the EWURA is to enhance the welfare of Tanzania society by:

i. Promoting effective competition and economic efficiency
ii. Protect the interest of consumers
iii. Protect the financial viability of efficient suppliers
iv. Promoting the availability of regulated services to all consumers
v. Enhancing public knowledge, awareness and understanding of the regulated sectors includes:

- The right and obligations of customers and regulated suppliers
- The ways in which complaints and disputes may be initiated and resolved, and
- The duties, functions and activities of the Authority
- Taking into account the need to protect and preserve the environment

In Section 7 the Act EWURA shall perform its functions in accordance with the legislation. In addition, and subject to sector legislation, other functions of EWURA includes to issue, renew and cancel licenses; establish standards for goods and services; establish standards for items and conditions of supply of goods and services, as well as to regulate rates and charges.

EWURA also monitors the performance of the regulated sectors in relation to levels of investment; availability, quantity and standards of services; the cost of services; as

well the efficiency of production and distribution of services and other matters related to the Authority.

Relevance to the Project

The project deals with provision of water supply and sewerage services, which are regulated by EWURA. In this regard the project has to comply with the requirements of EWURA with respect to the welfare of customers, protection of environment and provision of efficient, high standards and good quality services to consumers.

4.2.6 The Local Government (Urban Authority) Act No. 8 of 1982

This Local Government (Urban Authority) Act assigns responsibility to Urban Authorities the administration of taking measures for conservation of natural resources, safeguard and promote public health. Urban authorities in Tanzania are further required to take all necessary, reasonable and practicable measures for maintaining the area of their authority in clean and sanitary condition and for preventing the occurrence of or for remedying or causing to be remedied any nuisance or condition likely to be injurious or dangerous to health.

The proposed development is located in Morogoro urban where the provision of the Local Government (Urban Authority) Act applies. Even the assessment for this project was done while examining the role of the Urban Authority in promoting environmental management and public health by identifying different impacts and recommending their mitigation measures.

4.2.7 The Land Use Planning Act of 2007

The Land Use Planning Act No. 6 of 2007 provides procedures for the preparation, administration and enforcement of land use plans. Section 3 gives effect to fundamental principles of National Land Policy and the Human Settlements Development Policy that all persons and authorities exercising powers under, applying or interpreting this Act through land use planning among other things to:

i. Facilitate the creation of employment opportunities and eradication of poverty;
ii. Promote and include the participation of the private and popular sectors, Community Based Organizations, Non-Governmental Organizations, cooperatives and communities in land use planning;
iii. Protect the environment of human settlements and of ecosystems from pollution, degradation and destruction in order to attain sustainable development; Fundamental principles of land use.

The objectives of land use planning as stipulated in Section 4 includes;

i. Facilitate efficient and orderly management of land use;

ii. Empower landholders and users to make better and more productive use of their land;
iii. Promote sustainable land use practices;

Section 22 of the Act gives power to the Local Government Authorities to secure orderly and environmental sustainable development in the village, ward and to preserve the land resources including forest and wildlife. The proposed project is located within Morogoro Municipality near residential and commercial houses.

4.2.8 The Urban Planning Act, No. 8 of 2007

The objectives of the Act, among others, include to make serviced land available for shelter and human settlements development in general to all sections of community; improve the level of the provision of infrastructure and social services for sustainable human settlements development; facilitate the creation of employment opportunities and eradication of poverty; protect the environment of human settlements and ecosystems from pollution, degradation and destruction in order to attain sustainable development; and promote and include the participation of the private and popular sectors, Community Based Organizations (CBOs), Non-Governmental Organizations (NGOs), co-operatives and communities in land use planning.

Section 29 of the Act provides for issuing planning consent and submission of Environmental Assessment report. It states that no person shall develop any land within a planning area without planning consent granted by the planning authority. The consent of the planning authority shall be a condition precedent to the consideration by licensing authority of any application for the issue of a licence for any purpose involving development of land.

The application for planning consent to develop land must be accompanied by EIA report for all proposals concern industrial location, dumping sites, sewerage treatment, quarries or any other development activity which is likely to have injurious impact on the environment. The EIA study for the proposed water and sanitation project responds to the requirement of the Urban Planning Act and particularly section 29 of the Act and addresses significant impacts associated with the proposed development as well as possible mitigation measures to minimise the impacts.

4.2.9 Occupational Health and Safety Act of 2003

The Occupational Health and Safety Act makes provisions for the safety; health and welfare of persons at work in factories and all other places of work. In addition, it provides for the protection of persons other than those at work against hazards to health and safety arising out of or in connection with activities of persons at work.

Relevant sections of the Occupational Health and Safety Act are Part IV Section 43 (1) - Safe means of access and safe working place; Prevention of fire; and Part V on

health and welfare provisions, which includes provision of supply of clean and safe water to workers, sanitary convenience, washing facilities and first aid facility. Section 15 gives powers to the Registrar to enter any of the working places to perform his duties as provided by the Act. Section 16 requires that factories and workplace should register with Registrar before commencing operations. Part VI is dealing with special safety provisions for working places involving handling hazardous chemicals, hazardous processes or hazardous equipment.

This Act is relevant in this project as it requires safety during construction and operation as well as safety handling of hazardous wastes emanating from construction sites. The need to ensure that all workers and work stations adhere to the laws is imperative. Personal protective gear during all times the worker is at the site must be enforced to the maximum, and people who are not relevant to the site are prohibited.

4.2.10 EMPLOYMENT AND LABOUR RELATIONS ACT OF 2004

The Employment and Labour Relations Act (ELRA) makes provisions for core labour rights, to establish basic employment standards, to provide a framework for collective bargaining, to provide for the prevention and settlement of disputes and to provide for related matters. For instance, Part II of the ELRA describes fundamental rights and protections for child labour, forced labour, discriminations and freedom of associations. Part III of the ELRA provides for employment standards, which include issues like Hours of Work, Remuneration, Leave, Unfair Termination of Employment and Other Incidents of termination. Developer will abide to these requirements.

4.2.11 PUBLIC HEALTH ACT OF 2009

The Public Health Act No. 1 of 2009 provides for the promotion, preservation and maintenance of public health with a view to ensuring the provisions of comprehensive, functional and sustainable public health services to the general public and to provide for other related matters. The Act gives powers to the minister to promote, preserve and maintain a comprehensive, functional and sustainable public health system in Mainland Tanzania for the purpose of securing improvement in the health habits and lifestyles of people living in Tanzania.

The law gives power to relevant authorities to:

(a) Take lawful, necessary and reasonable measures to prevent the occurrence of or deal with any out-break or prevalence of any infectious or communicable and non-communicable disease;
(b) Make sure an appropriate Environmental Health Impact Assessment Study to be conducted for all activities as may be provided for under the Environmental Management Act;

(c) Safeguard and promote the public health standards;
(d) Issue notices for rectification of any breach of public health standards;
(e) Implement and enforce public health standards through bylaws;
(f) Promote public health standards in its area through creation of awareness and educational campaigns; and
(g) Carry out inspections.

With regards to water generation and management the law requires proper collection and dumping to the designated dumping sites using covered equipment or tools. The Public Health Act stipulates clearly that the developer should ensure welfare and health of workers is maintained at all times and make sure that routine medical examination for workers is conducted. The proposed water and sanitation project shall observe the provision of this Act.

4.2.12 THE ENVIRONMENTAL IMPACT ASSESSMENT AND AUDIT REGULATIONS (2005)

The Environmental Impact Assessment and Audit Regulations (2005) are made under Environmental Management Act No. 20 of 2004. The regulations provide basis for undertaking Environmental Impact Assessment (EIA) and Environmental Audit for various development projects with significant environmental impacts in the country. This section gives a brief description of some provisions in the regulations that are relevant to this study.

Part III of The Environmental Impact Assessment and Audit Regulation, formed under G.N. No. 349 of 2005, deals with project registration and screening procedures. Regulation 5 requires the applicant for Environmental Impact Assessment Certificate to submit a project brief report in the format shown in the THIRD SCHEDULE of the EMA (2004) and FIRST SCHEDULE to the Environmental Impact Assessment and Audit Regulation (2005). According to the provision, the applicant is required to submit a project brief report to the National Environment Management Council (NEMC).

Regulation 6(1) requires a developer I project proponent to register the project in accordance with format specified in the THIRD SCHEDULE of the regulations. The section also, specifies issues to be covered by the proponent in the project brief report. Section 6 (3) requires a project brief to be prepared by a registered environmental impact assessment expert.

According to Regulation 11(1) the proponent is required to undertake an environmental impact assessment if the project brief has no sufficient mitigation measures or undertake a preliminary assessment if more information is required to determine a screening decision.

Regulation 11(2) outlines relevant steps for undertaking a preliminary environmental assessment (PEA). These include:

- Description of the project characteristics and the affected environment.
- Identification of impacts on the local environment and
- Assessment or evaluation of the significance of the impacts.

Regulation 13(1) requires the Project Proponent to conduct EIA in accordance with the general environmental impact assessment guidelines and in accordance with the steps outlined in the FOURTH SCHEDULE of the regulations. Regulations 16 specifies EIA study should cover environmental, social, cultural, economic and legal issues. The FIRST SCHEDULE gives list of projects requiring and not requiring EIA.

Part X Regulation 44 (1 and 2) outlines the objectives of Environmental Audits and its principal functions. Regulation 45 outlines the basic principles under which the environmental audit is conducted and Regulations 46(1) specifies the type of projects requiring environmental audits as specified in the THIRD SCHEDULE to the EMA (2005) and the FIRST SCHEDULE of the Regulations

Relevance to the Project

According to the schedule, Type B Projects are those projects that are likely to have some significant adverse impacts but the magnitude of impacts is not well known. Thus, a PEA is required to determine whether the project should proceed without a full EIA.

4.2.13 STANDARDS GOVERNING WATER QUALITY IN TANZANIA

(a) International Standards

The relevant international standards governing environmental quality in Tanzania are those developed by World Health Organization (WHO). The WHO Standards appear as guidelines for drinking water quality set up in Geneva in 1993 and updated in 2006 (Appendix 4l). The guidelines form a reference point for standards setting and controlling of drinking water safety.

(b) National Water Quality Standards

The Tanzania standards for water quality are regulated through Water Utilization (Control and Regulation) Act of 1974 (Amendment 1981). This includes regulation on water pollution. The standards related to effluents and receiving waters are specified in the law and should be complied with by users of water before or during discharge into watercourse, receiving waters or municipal sewerage systems. Under the Act no person may discharge effluents from commercial, industrial or other trade waste systems into receiving water without consent duly granted by a Water Officer.

In Tanzania, discharge permit is granted by Public Water Office (PWO) and Water Basin Office (WBO) for new industries/plants only. Although old plants are not regulated through discharge permits, they are required to comply with national effluent standards.

The prescribed Tanzania Water Quality Standards as shown in Appendix 5 include Drinking Water Quality Standards (TZS 574 Part 1:1999); and Receiving waters and Effluents Discharge Standards.

Drinking Water Quality Standards

According to the Drinking Water Quality Standards, water is considered drinkable when it meets the standards for physical, chemical, biological, and bacteriological characteristics (e.g., standards for turbidity, presence of microbiological organisms, and presence of other organic, inorganic, and radioactive substances).

The drinking water quality standards for Tanzania are specified in the Tanzania Standards (TZS 574 Part 1: 1999) developed by the Tanzania Bureau of Standards (TBS). The water quality standards provide quality standards for drinking water and bottled water. The standards are based on the Kenya standards (KS 05-459 Part 1, Maji Review Vol. l, 1974) and on the Guidelines for Drinking Water, Vol. 1 (WHO, 1984).

The standards define 'drinking water' as 'potable water intended for human consumption' and 'bottled drinking water' as 'drinking water that has undergone treatment of filtration, decantation, chlorination and de-chlorination, UV radiation and/or ozonation prior to packaging'. The standards specify limits of microbes for the following categories of drinking water:

- Piped water supplies;
- Un-piped water supplies;
- Bottled drinking water;
- Emergency water supplies.

The drinking-water standards also provide limits and sampling and testing methods for toxic substances, aesthetic quality, organic constituents, and radioactive materials.

Effluent and Receiving Water Quality Standards

The effluent discharge and receiving water quality standards are shown in the Water Utilization (Control and Regulation) Amendment Act No. 10 of 1981 (Second Schedule: Effluent Standards) and the Tanzanian Standards for Municipal and Industrial Wastewaters (TZS 860: 2005; ICS: 13.060.30). The standards are

comprised of receiving water quality standards, the effluent quality standard and the domestic water standards.

The Effluent Standards deal with effluents for direct discharge into receiving waters. The restrictions are that those effluents should not cause sludge or scum, and should not cause change in colour, natural taste or odour; and should not cause temperature change by more than SOC. The standard also deals with effluents for indirect discharge into receiving waters through municipal sewerage plant. It specifies that effluents should not have more than 3S °C or not exceed S°C above ambient temperature of supplied water.

The Receiving Water Quality Standards provide maximum permissible concentration, and is divided into 3 categories, i.e. 20 mg/L for Category I & ll and 30 mg/L for Category 111. The Category I is concerned with drinking water supplies, swimming pools, food and beverage manufacturing industries, pharmaceuticals manufacturing industries or industries requiring water source of similar quality. Category II deals with the use of water for domestic animals, fishing, shell cultures, recreation and water for sports. Category lll relates to water for irrigation and other industrial activities requiring water quality standards lower than those in Category I and 11.

4.2.14 INTERNATIONAL CONVENTIONS AGREEMENTS/TREATIES

(a) Convention on Safety and Health in Construction

This Convention applies to all construction activities mainly buildings, civil engineering and erection and dismantling work including any process, operation or transport on a construction site, from the preparation of the site to completion of the project.

Relevance to the Project

This project involves construction activities which could create risk of safety and health to construction workers due to dust emission and construction related accidents to operation and movement of heavy construction equipment I machinery. Thus, the Contractor will be required to take all precautions regarding the safety and health of construction workers. This includes provision of safety gears and personal protection equipment (PPE), as well as medical care in case of injuries.

(b) The New Partnership for Africa's Development (NEPAD)

The New Partnership for Africa's Development (NEPAD) was formally launched in 2001. The long-term objectives of NEPAD are embodied in Articles 174 -188. These are poverty eradication, placing the continent on the path of sustainable development and promoting the role of women in all activities. Immediate goals of NEPAD are to: strengthen mechanisms for conflict prevention, resolution and management,

promoting and protecting democracy and human rights, restoring and maintaining microeconomic stability, etc.

The Environment initiative in NEPAD recognizes the need for a healthy and productive environment. Eight sub-themes of the initiative emphasized arresting of desertification, conservation of wetlands and cross-border areas, preservation of ecosystems, management of the coastline, global warming, environmental governance and the financing of all these [Article 141]. However, the NEPAD document does not articulate how environmental resources such as land, water, wetlands and forests will be dealt with under its Environmental Initiative. In addition, there is no strategy in the NEPAD document or a framework for enforcing environmental governance in Africa.

Relevance to the Project

The project is intended to alleviate poverty, which is one of the objectives of this convention. The project management is also required to promote participation of women in the project activities as another objective of this convention.

4.2.15 INTERNATIONAL FINANCE CORPORATION'S POLICY ON ENVIRONMENTAL AND SOCIAL SUSTAINABILITY (2012)

The IFC (2012) strives for positive development outcomes in the activities it supports in developing countries. IFC believes that an important component of achieving positive development outcomes is the environmental and social sustainability of these activities, which IFC pursues and expects to achieve through the application of this Policy on Environmental and Social Sustainability (the Sustainability Policy or the Policy), and a comprehensive set of environmental and social Performance Standards. The EIA also is complying with the IFC applicable requirements of the Performance Standards and mitigation measures are included in the management and monitoring plans.

With regard to stakeholder consultation; the IFC require clients to engage in a process of Informed Consultation and Participation (ICP) in cases where the development project to be financed is likely to generate potential significant adverse impacts on communities (i.e., Affected Communities) or is likely to generate potential adverse impacts on local Peoples. This EIA involved stakeholders at all stages.

4.2.16 THE EQUATOR PRINCIPLES (EP)

The Equator Principles (EPs) is a risk management framework, adopted by financial institutions for determining, assessing and managing environmental and social risk in projects and is primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. The EPs apply globally, to all industry sectors applying for financier. The Equator Principles apply to the four financial

products namely Project Finance Advisory Services, Project Finance with total Project capital costs of US$10 million or more, Project-Related Corporate Loans Export Finance in the form of Buyer Credit and Bridge Loans with a tenor of less than two years that are intended to be refinanced by Project Finance or a Project-Related Corporate Loan.

The Equator Principles Financial Institutions (EPFIs) are implementing the EP in their internal environmental and social policies, procedures and standards for financing projects and cannot provide Project Finance or Project-Related Corporate Loans to projects where the client cannot, or is unable to, comply with the EP. The EPFI will only provide Project Finance and Project-Related Corporate Loans to Projects that meet the requirements of Principles 1-10 as described in Equator Principles III of June 2013.

The implementation of the EPs follows the procedure if the applying project is implemented in non- designated country the applicable IFC Performance Standards on Environmental and Social Sustainability (Performance Standards) and the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) (Exhibit III) are considered as bases for compliance and the project has to adhere to these performance standards. For Projects located in Designated Countries, the Assessment process evaluates compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues. Host country laws meet the requirements of environmental and/or social assessments (Principle 2), management systems and plans (Principle 4), Stakeholder Engagement (Principle 5) and, grievance mechanisms (Principle 6). The proposed development is taking place in designated country and therefore the project is mandated to comply with all relevant laws, policy and permits of the country as addressed in Chapter Three of this document.

Similarly, the project complies with a number of EPs such as l Principle 1- Screening of the project, the EMA 2004 and EIA and Audit regulation of 2005 screened the project and categorized as the project that requires mandatory EIA assessment. Principle 2 has been complied by undertaking this comprehensive EIA. Similarly, Principle 3 has been complied, as the operation of the proposed project will be gauged based on applicable environmental social standards issued by EMA on air quality standards (Regulations 2007) and other national standards. Other areas where the project complies with EPs include on stakeholder engagement as described in chapter 5 of this document, monitoring and evaluation as described in Environmental and Social Management and Monitoring plan, as well as reporting of Monitoring and Auditing result.

4.3 INSTITUTIONAL AND ADMINISTRATIVE FRAMEWORK

The proposed development will take place in Morogoro Municipality, Morogoro Region. For administrative purposes, the project area falls under the jurisdictions of the Morogoro Municipal Council and the MORUWASA and Morogoro Regional Administration/Secretariat. Since it is about water and sewerage construction project, its administrative framework also falls under the Ministry of Water and irrigation and other line ministries such as Ministry of Land, Housing and Human Settlement, Ministry of Infrastructure Development and Vice President Office Division of Environment which will be responsible for lands use plan and general environmental related issues.

Other institutions whose administrative decisions will be relevant to the proposed factory include the Ministry of Energy and Minerals for energy related issues. The Ministry of Labour and Employment will be responsible for ensuring that labour rights and employment standards are adhered. Moreover, Occupational Safety and Health Authority (OSHA) will be responsible for ensuring compliance to occupational health and safety issues as provided under OSHA rules and regulations. The project proponent will be responsible in ensuring that section managers and other staff comply with the requirement set forth in the permit conditions and laws and regulations associated with construction and operation of the factory. In addition, developer will be responsible in providing financial resources essential to the implementation of the environmental monitoring plan provided in this EIA. This EIA addressed the administrative set up and the extent the project has fostered co-ordination among key decision makers and actors.

Other relevant institution is the National Environment Management Council which is responsible for undertaking enforcement; compliance, review and monitoring of environmental impact assessment (EIA). It prepares and submits bi-annual report on the implementation of the provisions given in the National Environment Management Act of 2004, and how it has fulfilled the objectives and purpose for which it has been established. This project is registered with NEMC and has monitored all the procedures for undertaken this EIA study including issuing the certificate.

5.0 BASELINE/EXISTING CONDITIONS

5.1 LOCATION AND GEOGRAPHICAL SETTINGS

Morogoro Municipality is about 195 kilometres to the west of Dar es Salaam and is situated on the lower slopes of Uluguru Mountains. The Municipality is situated at the crossroads of the Dodoma and Iringa Highways, lies between latitudes 6^0 49' and 60" South of the Equator and longitude 37^0 4' and 38" East of the Greenwich Meridian. It lies between 480 and 520 masl. The Municipality borders Mvomero District to the North West and Morogoro Rural District to the South East.

Morogoro Municipality has a total land area of 531sq.kms. This land coverage constitutes 0.4% of the total regional area. The major physical features include the famous Uluguru Mountains, which lie in the south-eastern part, and Mindu mountains, which lie in the western part.

There are three main rivers with several tributaries, which form a number of alluvial flood plains. These rivers are the Morogoro, Kilakala, and Bigwa. Other sources of water are the Mindu Dam' which was built in the late 1980s to serve for the industrial activities as well as domestic purposes.

Figure 3: Location of Morogoro Region

5.2 CLIMATE, SOIL AND TOPOGRAPHY

With exception of very few slopes, the district is relatively homogeneous with gently undulating plains intersected by seasonally streams. In the extreme southern-east and western part of the district gives way to mountainous land covered by forest, commonly known as Uluguru Mountains and Mindu mountains respectively. The flat belt located in the central and northern parts. The Municipal is covered by loam, sandy loam and clay soil. The soils vary between red lateritic earth grey sand to silt hardpan and iron crust “mbuga”. Moreover, there are sandy clay loam and reddish coloured soils on inter flute slopes that are saturated with water within 100 cms of the surface during the growing season. The majority of these soils have high nutrient contents and are considered suitable for a wide range of food and cash crops and therefore have the potential for profitable cultivation.

Figure 4: Mindu dam

Despite the variation of climatic conditions throughout the year the weather is attractive because of its high altitude. Morogoro experiences average daily

temperature of 30°C degrees centigrade with a daily range of about 5°C (degrees centigrade).

The highest temperature occurs in November and December, during which the mean maximum temperature is about 33°C (degrees centigrade). The minimum temperature is in June and August when the temperatures go down to about 16°C (degrees centigrade). The mean relative humidity is about 66% and drops down to as far as 37%. The total average annual rainfall ranges between 821mm to 1,505mm. Long rains occur between March and May and short rains occur between October and December each year (see table below). The two rain seasons are:

(i) The Long Rain Season

The long rain season lasts for roughly 120 days between March and June every year. The rains are usually heavy and spread throughout the Municipality. This is also the main crop planting season for all crops, but especially so for the seasonal crops such as maize, paddy and beans.

(ii) The Short Rain Season

The short rain season lasts for about 60 days between October and December each year. The rains are not evenly distributed and they are not very reliable. They are most suitable for short term crops such as pulses.

Table 1: Mean annual rainfall – Temperature humidity:

Month	Temperature		Humidity %	Rainfall [mm]
	Max.	Min.		
January	26.3	21.3	74.6	105
February	26.3	20.5	77	97
March	26.1	20.7	79.6	133
April	25	20.6	84.6	198
May	23.5	19.6	84	79
June	21.6	16.1	79.3	19
July	21.1	14.8	77	13
August	22.1	16.0	73.6	11
September	23.2	16.4	72	20
October	24.6	17.6	70.3	43
November	25.7	19.5	71.6	98
December	26.5	21.2	72.6	119

Source: Meteorological Department Sokoine University of Agriculture, Morogoro 2014

5.2.1 GEOLOGY AND SOILS

The geology of the area is dominated by Palaeoproterozoic (Usagaran) meta-igneous and sedimentary rocks with relics of Neoarchaean basement, re-worked during the Neoproterozoic tectothermal event6. The soils in the project area are sandy loams, which are moderately deep and excessively drained.

The land of Morogoro is characterized by the following three major features:

Uluguru Mountain Area

Found on the ridge of the Uluguru Mountain are stone and loam soil, losing its fertility and productivity due to continuous cultivation and subsequent degradation resulting from soil erosion activated by steep slopes. These mountains are the main catchments area where most of Morogoro river streams originate.

Mountain Slopes

This area is on the foot slopes of Uluguru Mountain, and has most fertile soils that support cultivation of many crops.

Low Lands

This land is found along the floodplain of Ngerengere and Morogoro Rivers. The area is highly prone to flooding.

5.3 WATER SOURCES AND PRODUCTION

Water supply to the distribution network is from two main sources, Mindu system and Mambogo system. Water from Mindu Dam gravitates to Mafiga Treatment plant after which it is pumped to Tumbaku reservoir. From here water gravitates to low areas of the distribution network whereas higher areas receive water from elevated tanks whose water is pumped from Tumbaku reservoir site. The Mindu/Mafiga system serves about 70% of the distribution network. Mambogo system serves the distribution system in the southern part of the Municipality. Other small sources serve small discrete areas within the network on the south-eastern part. The distribution network as at March 2017 was 358km.

Water demand for Morogoro Municipality as at March 2017 was estimated to be 47,066m^3/day whereas installed water production was 34,000m^3/day. During the month under review the amount of water produced was 11,686,695m^3 while the billed amount was 768,819m^3. The number and percentage of population served is shown in table 2 below.

Table 2: Number and percentage of population served

Category	Institutional	Household	Yard tap	Kiosk	Total
Total population	-	-	-	-	379,568
Population covered (estimated figure)	65,000	181,720	5,620	1,875	270,723
Percentage	**17.12%**	**47.88%**	**1.48%**	**4.48%**	**71.32%**

Source: MORUWASA Monthly Progress Report March 2017

The total population living within the area with network is estimated to be 90% of the total Municipal population. Until March, 2017 MORUWASA had 28,477 water customers out of which 23,527were active and 4,947 were disconnected. Cumulatively a total of 4,947customers were disconnected due to various reasons including delay in payment of water bills. 347 customers who settled their water bills were reconnected.

Table 3: Distribution of Water connections by categories

Category	Disc	Active	Total
Commercial	279	597	976
Domestic	4,362	22,357	26,719
Industrial	12	51	63
Institutions	193	458	651
Kiosks	85	80	165
Water by Tanks		2	2
Total	**4,931**	**23,545**	**28,476**

Source: MORUWASA Quarterly Report 2017

5.4 SANITATION CONDITIONS

The common sanitation system used by the Municipal population is flushing toilets and septic tanks connected to soak away systems. Pit latrines are common in planned and unplanned areas due to the high cost of connection into sewerage system, low coverage of the sewerage system and non-availability of water supply.

Distribution of sanitary facilities in each Ward is elaborated on table 4 below:

Table 4: Sanitary and Toilets Coverage in each Wards

S/N	Wards	Number of Households	Number of houses with flushing toilets	Number of houses with pit latrines	Number of houses with septic soak away pit
1.	Mafisa	2396	1900	438	1844
2.	Uwanja wa Taifa	638	432	206	432
3.	Sultan Area	269	99	170	88
4.	Boma	1113	882	231	677
5.	Sabasaba	306	300	6	80
6.	Chamwino	3282	488	2565	488
7.	Bigwa	2877	555	2185	555
8.	Kingo	325	315	10	0
9.	Mji Mpya	614	143	471	0
10.	Kiwanja cha Ndege	3280	2857	423	2857
11.	Mlimani	983	374	520	374
12.	Kichangani	3355	370	2262	370
13.	Mkundi	3062	1562	500	1562
14.	Lukobe	5982	3781	478	3781
15.	Kilakala	2317	930	1304	930
16.	Mafiga	1270	946	314	946
17.	Luhongo	1478	504	974	0
18.	Mji Mkuu	405	325	80	0
19.	Mwembesongo	3227	2013	1214	1829
20.	Mbuyuni	586	224	361	212
21.	Magadu	1350	495	855	495
22.	Kihonda	2667	843	1824	843
23.	Tungi	4305	1331	2936	1331
24.	Kihonda Magorofani	2410	1868	542	1868
25.	Mindu	1638	216	1196	216
26.	Kingolwira	1505	228	1185	228
27.	Kauzeni	401	29	372	29

28.	Mzinga	248	14	230	14
29.	Mazimbu	2001	1710	291	1710
	Total	**54289**	**25734**	**24143**	**23759**

Source: National Sanitation Campaign Quarterly Report Morogoro Municipal Council October – December 2016

Morogoro Municipality has central sewerage which serves a total population of 18,302 accounting for approximately 5.08% of the total Municipal population with a total length of 38 Kilometres, which include 10 kilometres of main sewer, and 28 kilometres of laterals.

The sewerage system covers the Central Business District (CBD) mainly Sabasaba, Mji Mkuu, Kingo, Boma and part of Mwembesongo, Mji Mpya, Mbuyuni and Mafiga Wards. It has also 6 wastewater treatment ponds out of which 4 are maturation, one facultative and one anaerobic. On the other side, the Authority had a total of 1,756 sewerage connections compared to 1,495 of the previous year (an increase of 17.4%).

The table 5 below gives a summary of the current number of houses with sewer connections in various wards within the project area.

Table 5: Houses in the Project Area with Sewer Connections

S/N	Wards	Number of Connections
1.	Mwembesongo	422
2.	Mazimbu	23
3.	Uwanja wa taifa	2
4.	Kingo	291
5.	Sabasaba	201
6.	Mji mpya	120
7.	Sultan	35
8.	Mji mkuu	310
9.	Mafiga	72
10.	Mbuyuni	82
11.	Mlimani	1
12.	Kiwanja cha ndege	1
13.	Boma	196

The Municipal Council owns two septic tanks emptying trucks each with a capacity of about 6,500 litres procured under URSP. However, the operating truck is only one

with capacity of only eight trips per day. The waste water is normally disposed of at Mafisa Waste Stabilization Pond owned by MORUWASA. The emptying charges is Tshs. 12,000/- for individuals and Tshs. 15,000/- for commercial, Institutions and Industrials.

5.4.1 AFFORDABILITY AND WILLINGNESS TO PAY

Affordability or the ability to pay is a social aspect for water supply and/or sewerage services provision that is most clearly and closely linked to pricing policies. The ability to pay varies across income groups and locations.

The willingness to pay is affected by the income, the quality of service and the likely social and economic benefits that the service may bring to the household.

In setting tariffs for water supply and sewerage services the authorities are faced with the dilemma of considering on one hand the affordability of consumers and on the other hand the sustainability in providing adequate services. In considering for consumers the authorities generally adopt the role of protector of the poor community and set tariffs at the considered affordable prices.

The National Water Policy and the National Strategy for Growth and Reduction of Poverty (NSGRP), emphasizes on the provision of safe and clean water to the poor, regardless of their ability to pay for the same, through the following;

(a) A kiosk should be provided where there is a demand for such service (50 households or 10% of all households within a radius of 200 meters are unable to afford a connection to their property),
(b) The local authority may provide poor families with tokens enabling them to obtain a basic water supply from kiosks.

Application of the above basics is clearly translated by MORUWASA, by the following facts; Number of Poor households identifies is 830. Number of Poor households whose water services is being paid by MORUW ASA is 483.

5.5 FLORA AND FAUNA

There is no endangered or rare species of flora and fauna in the project area. However, the Mindu Catchment Forest Reserve, which is located about 6 km west of Morogoro Town, is an important area to the project. The reserve forms an important source of water to the Ngerengere River, which is the source of water to Mindu Reservoir and consequently the source of water to Morogoro Municipality.

The forest is of the Eastern Arc type, as it contains species of restricted distribution, with biodiversity value being concentrated in certain vegetation types. These include woodland vegetation, evergreen forest and sub-montane forests.

5.6 LAND DEGRADATION

The cultivation activities on the upper catchments have resulted into severe land degradation. This is evidenced by increased run-off, sedimentation of rivers and Mindu Reservoir. The degradation of water catchments also leads into drying of some rivers that feed the Mindu Reservoir. The sedimentation and siltation of Mindu Dam leads into reduced reservoir capacity. In general, bad cultivation practices, frequent bush fires on the Uluguru Mountains (See Figure 4-3) and lack of conservation on the upper catchment may jeopardize the sustainability of the project, especially the Mindu Dam.

5.7 ADMINISTRATIVE SET UP

The Municipality lies within Morogoro district, is one of the Seven (7) Councils of Morogoro region. Other districts are Kilosa, Kilombero, Ulanga, Morogoro District Council, Gairo District Council and Mvomero District council (see the figure below). The Municipality has only one Division which is divided into 29 administrative wards and 302 Mitaa.

The Council is composed of twenty-nine [29] elected Councilors from each of the twenty-nine wards [24 male and 05 females], ten [10] women Councilors nominated from the ruling party [Chama Cha Mapinduzi-8] and 2 from Chadema Party. Furthermore, there are three members of Parliament in which one is elected and two are nominated for special seats. Therefore, the Council has 42 Councilors in total. The Full Council is composed of all councilors and is the final organ in making decision on council matters. It has legal powers to make by laws, enter into contract and approves annual financial budget of the council.

Municipal Staff:

The Managerial team is comprised of thirteen Heads of Department and six heads of units, headed by the Municipal Director who is, according to Financial Memorandum, the Accounting Officer of the Council. The Council has a total of 3,719 out of which 2,620 employees belongs to education sector i.e. 70.44%. Morogoro Municipal Council has thirteen departments and six independent sections which report direct to Municipal Director. The Municipality is also administered with five standing committees, namely: Finance and Administration Committee; Economic Affairs, Health and Education Committee; Town Planning and Environment Committee;

HIV/AIDS Prevention and Control Committee, as well as Ethical/code of conduct Committee.

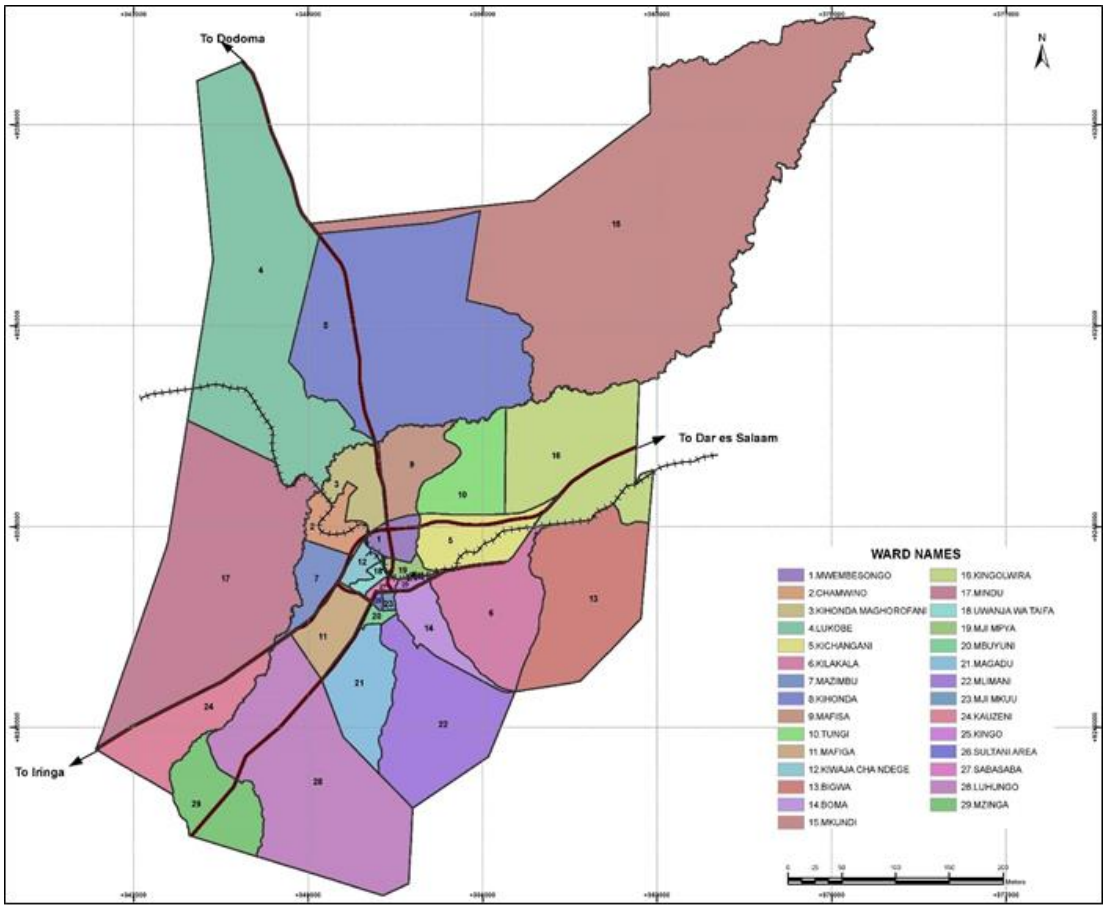

Figure 5: Map showing Morogoro Municipality new wards

5.8 POPULATION

5.8.1 ETHNIC GROUPS

Initially inhabitants were mainly of the Luguru tribe. However, the composition of the current population is getting more cosmopolitan due to the influx of workers, businessmen and fortune seekers from different regions of Tanzania, as well as from outside the country. Nevertheless, the Council has three main ethnic groups namely: Waluguru, Wapogoro and Wakutu. The majority of Waluguru occupy the largest part of the district area which covers all wards, followed by Wapogoro occupying some parts of the Municipal wards. In addition, the district is also occupied by other ethnic tribes including Wazaramo, Wakwere, Wachaga, Wasukuma, Wanyakyusa and Maasai.

5.8.2 POPULATION SIZE AND GROWTH

According to population and Housing census of 2012, the population of the Municipality was **315,866** people in the ration of **52.15%** of women (164,166) and

47.85% of men (151,700), the growth rate in the Municipality is 4.7% per annum and the average income of a person per year is **Tshs. 539,375.00** (Source: NBS Household Budget survey, 2007).

Table 6: Population trend from census 1967 to 2012:

No.	Year	Total population
1.	1967 census	24,999
2.	1978 census	74,114
3.	1988 census	117,601
4.	2002 census	227,921
5.	2012 Census	315,866
6.	Projection 2016	359677

Source: National Bureau of Statistics 2012

Table 7: The Census population by Ward (Year 2012 Projection):

S/No.	Ward Names	Population
1	Mwembesongo	26,202
2	Chamwino	27,533
3	Kihonda Maghorofani	21,205
4	Lukobe	19,171
5	Kichangani	19,166
6	Kilakala	18,345
7	Mazimbu	16,679
8	Kihonda	17,857
9	Mafisa	17,369
10	Tungi	13,779
11	Mafiga	13,586
12	K/Ndege	12,203
13	Bigwa	10,149
14	Boma	8,706
15	Mkundi	8,200
16	Kingolwira	7,370
17	Mindu	7,110
18	Uwanja wa Taifa	7,247
19	Mji Mpya	7,359
20	Mbuyuni	6,225
21	Magadu	5,561
22	Mlimani	4,893
23	Mji Mkuu	4,612

24	Kauzeni	3,971
25	Kingo	2,944
26	Sultan Area	2,604
27	Sabasaba	2,339
28	Luhungo	2,133
29	Mzinga	1,348
TOTAL		**315,866**

Source: Provisional Result from Census 2012:

Looking at Ward level, Chamwino had the largest population in the Municipal with 8.72 percent in 2012, followed by Mwembesongo at 8.30 percent and Lukobe 6.07 percent of total municipal population.

5.8.3 The Influence of Population Growth

The migration has increased from 24,999 in 1967 to 315,866 in 2012, (see the table below). The increase is due to various reasons including: increase of factories and industries growth of trading centers, expansion of agricultural activities, and expansion of infrastructure. Such development undertakings have fueled the increase migration from rural to the urban industrial area. In turn these migrants have involved themselves in employment and self-employment in agriculture, business, petty trading and other town venture activities.

Table 8: Population of the Municipality as percentage of the Regional total:

Year	1967	%	1978	%	1988	%	2002	%	2012
Pop.	24,999	3.7	74,114	8	117,601	9.6	227,921	4.7	315,866

Source: Compiled data from 1967, 1978, 1988, 2002 and 2012 census.

This rapid growth of population created a gap in service delivery, whereby the council could not fulfil e.g.:-

- Inadequate health services;
- Inadequate safe and clean water supply;
- Shortage of housing and school facilities – desks, etc.;
- Inadequate capacity for infrastructure expansion and maintenance e.g. roads

This influence of population growth can be exemplified by the percentage of people who are engaged in different activities as follows:

This influence of population growth can be exemplified by the percentage of people who are engaged in different activities as follows:

- Agriculture 35.3%
- Employed in government institutions 30.2%

- Non-Agriculture and Others 34.5%.

5.8.4 POPULATION DENSITY

According to the Population and Housing Census of 2012, Morogoro Municipality, with an average population density of 594.4 persons per sq. km is considered to be the most densely populated district in Morogoro Region.

Table 9 gives the population density at ward level for the census year of 2012. In 2012, Mwembesongo with a population density of 9,053.90 persons per sq. km was the most densely populated ward in the district, followed by Uwanja wa Taifa Ward with 8,606.89 persons per sq. km. Luhungo was the least densely populated division as it had only 47.64 persons per sq. km.

Table 9: Population Density by Ward, Morogoro Municipal Council, 2012

S/N	Wards	Streets	Population (2012)	Land Area (Sq.km.)	Population Density (Persons per Sq.km)
1	Mwembesongo	16	26,202	2.894	**9,053.90**
2	Chamwino	15	27,533	4.328	6,361.60
3	Kihonda Maghorofani	08	21,205	6.243	3,396.60
4	Lukobe	08	19,171	57.847	331.41
5	Kichangani	12	19,166	9.203	2,082.58
6	Kilakala	15	18,345	16.49	1,112.49
7	Mazimbu	07	16,679	4.291	3,886.97
8	Kihonda	10	17,857	67.181	265.80
9	Mafisa	09	17,369	7.934	2,189.19
10	Tungi	12	13,779	10.303	1,337.38
11	Mafiga	15	13,586	5.792	2,345.65
12	K/Ndege	13	12,203	1.544	7,903.50
13	Bigwa	13	10,149	25.612	396.26
14	Boma	09	8,706	5.375	1,619.72
15	Mkundi	11	8,200	118.216	69.36
16	Kingolwira	08	7,370	26.979	273.18
17	Mindu	12	7,110	55.358	128.44
18	Uwanja wa Taifa	11	7,247	0.842	8,606.89
19	Mji Mpya	12	7,359	1.221	6,027.03

20	Mbuyuni	06	6,225	0.757	8,223.25
21	Magadu	09	5,561	10.44	532.66
22	Mlimani	15	4,893	23.111	211.72
23	Mji Mkuu	07	4,612	0.551	8,370.24
24	Kauzeni	06	3,971	11.169	355.54
25	Kingo	05	2,944	0.527	5,586.34
26	Sultan Area	15	2,604	0.386	6,746.11
27	Sabasaba	12	2,339	0.552	4,237.32
28	Luhungo	07	2,133	44.771	47.64
29	Mzinga	05	1,348	11.433	117.90
TOTAL		**Total**	**315,866**	**531.4**	**594.46**

Source: Morogoro Municipal Profile 2016

5.8.5 Population Distribution and Sex Ratio

According to the Population and Housing Census of 2012, Morogoro Municipality has a Sex Ratio of 92 males for every 100 females. This is partly due to the fact that, traditionally, males in Morogoro Urban District are much more mobile than females, and as such more likely to move to Dar es Salaam to look for employment in industries and other businesses. It has been revealed that this rapid growth of population created a gap in service delivery, which the council could not fulfil e. g: -

- Inadequate health services;
- Inadequate safe and clean water supply;
- Shortage of housing and school facilities – desks, etc.;
- Inadequate capacity for infrastructure expansion and maintenance e.g. roads

This influence of population growth can be illustrated by the percentage of people who are engaged in different activities as follows:

- Agriculture - 35.3%
- Employed in government institutions - 30.2%
- Non-Agriculture and Others - 34.5%.

5.8.6 Households and Household Size

Perhaps due to its relative small geographical area and population size, Morogoro Urban District had the average 4.1 number of households. With a population of 315,866 according to the 2012 census, there were 77,040 private households with 4.1 persons per household.

5.9 LAND USE

Land allocation for various uses depend on; location, size and accessibility. Land for business, industry, open space, institutions and residential use have the highest potentiality. Categories of land uses in Morogoro Municipality are as presented in the following sections.

A) Residential Use

Land use for residential purposes is divided into two categories, planned and unplanned residential. The Municipality has land designated for either scattered (low density) or concentrated (high density) settlement pattern. Residential areas are found on the periphery of the CBD. As the population increases, more land for residential purposes is being converted from the nearby village land into urban use. Total municipal land developed for residential purposes covers 443.5 ha.

B) Institutional Use

About 19% of Morogoro Municipality is under institutional land use, such as hospitals, educational, religious and governmental offices. Major areas covered under this category are covered by Sokoine University of Agriculture (SUA), Muslim University of Morogoro (MUM), Mazimbu Education Complex, the Junior Seminary, Mgololo Sisters Convent, Bigwa Convent, Bigwa Folk Development, Workshop Areas, Secondary and Primary Schools. Institutional land use category covers about 9,747 ha.

C) Forestry Use

Forestry involves the process of planting trees, managing and harvesting forest products. Areas under this category are zoned for the purpose of protecting water catchments areas; enhance biodiversity, climatic and ecological balance.

Morogoro Municipality has a total area of 11,318 ha of forest land. Predominant forest reserve areas include Mguru wa Ndege near Mindu Dam, the Uluguru north forest reserve and part of Morogoro forest fuel reserve.

The forest products requirement for the municipal population is much higher than the supplied products from the available forest reserves. On the other hand, there are human activities threatening the existence of the remaining forest reserves, such as frequent fire out breaks, charcoal burning, tree cutting for furniture making, etc.

Between 1987 and 2005, about 86 ha of forest reserves have been converted into residential use; and about 1,089 ha have been turned into urban farming.

D) Commercial Use

This category of land comprises a variety of facilities for sale and purchase of commodities and services, such as automobile services, retail shops, professional offices and commercial recreation facilities, located at the CBD where commercial/residential buildings exist. Commercial land category covers 13% of the total municipal land use.

E) Industrial Use

Industrial land use category includes processing and manufacturing. Major industries are located at Kihonda, in spite that few are actually operating. Land assigned to industrial uses covers 0.62% of the total municipal area.

F) Open Spaces

Open spaces include public meeting places, playgrounds, golf courses, cemeteries and parks. They cover 320 ha which is 26% of total municipal land. Management of open space as a recreational and ecological resource has a great potential to the environment and wellbeing of the people.

G) Agriculture Use

The Municipality has a total of 19,226 ha for agricultural activities, where about 9,768 ha are in use. The distribution of land under agriculture is as follows:

- 57% Potential agriculture
- 17% Forest reserve
- 13% Land under cultivation 13% Grazing land

H) Transport

Morogoro is a prominent node for both road and railway transportation systems. The central railway line of Tanzania Railways Corporation has a main station in Morogoro and a central railway workshop that gives it a special focus of railway communication in the country.

The Municipality is strategically placed at the crossroads of two major highways of Dar es Salaam-Dodoma that serves the western, while Dar es Salaam-Mbeya serves the south-western part of Tanzania including Malawi and Zambia. [Tanzania-Zambia] TANZAM.

The existing small airstrip mainly serves for charter planes. The absence of public air service in Morogoro is partly caused by its proximity to Dar es Salaam where there is cheap and reliable road transportation to all other parts of the country.Water Bodies

The major water bodies include the Morogoro, Ngerengere, Mlali, Mzinga Rivers and Mindu Dam. Total area covered by water body is 403 hectares.

5.10 ECONOMY AND EMPLOYMENT

Morogoro Urban District, like other districts of Morogoro region, has never computed its GDP and Per capita GDP since it was established. Nevertheless, Morogoro Urban District makes significant contribution to the Regional GDP and per capita GDP. The 2009 Economic Survey Report shows that Morogoro region's share of the national GDP was 5.1 percent equivalent to TShs.1, 137,317 million and ranked number 6. While Per capita income of regional residents was estimated at TShs.665, 618 which was less than that of Tanzania Mainland (Tshs.693, 470).

Poverty Indicators

As stated earlier, beside GDP and per capita GDP, there are a number of indicators that portray the poverty level. These indicators include Gini coefficient, poverty gap, percent of households below basic needs poverty line, main source of cash income, food consumption patterns, net enrolment, adult literacy rate, health indicators, access to safe drinking water. They also include housing conditions in terms of types of toilets, roofing materials, household's assets, and sources of lighting energy as well as sources of cooking energy.

Labor force in the Municipality falls under the following categories;

- Formal and Informal Sectors Employees,
- Public and Private Employees,
- and Unemployed Labor Force

5.10.1 ECONOMIC ACTIVITY SECTORS

Major economic activities in Morogoro Municipality which the Labor Force is undertaken include;

- Industries of primary and secondary level. These includes; Morogoro Canvas Mills, Tanzanian Packaging Manufacturers Ltd, Morogoro Ceramics, Abood Seed Oils, Tanzanian Tobacco Industries
- Subsistence & commercial agriculture;

- Small scale entrepreneurship. These include; food vending and petty trading , retail shops, kiosks and food stalls, and
- Commercial retail as well as wholesale termed as trade and commerce; forestry; fishing; mining & quarrying; public administration and education.

5.10.2 AGRICULTURE AND LIVESTOCK

About 65% of the workforce of the Municipality are engaged in urban agriculture and 30% keep livestock. The urban agriculture is comprised of small gardening in built up areas; gardening in undeveloped areas; and cultivation of large farms and/or livestock keeping in peri-urban areas.

(a) Small Gardens

Small gardens mainly m built up areas whereby vegetables, tree crops such as oranges, mangoes and banana are grown. Gardening is practiced mainly in Mlimani Ward with steep slopes. However, cultivation in this area is carried out without contours or terracing, hence leading into soil erosion and loss of soil fertility, which results into poor yield. Thus, to overcome the problem people revert into shifting cultivation, application of artificial fertilizer and animal manure.

(b) Gardening in Undeveloped Areas

The gardening or horticultural activities is carried out in river valleys and wetland areas that allow cultivation to be carried out during dry seasons. Most of these areas are usually undeveloped areas owned various institutions.

(c) Cultivation and in peri-urban areas

The peri-urban agriculture is carried out in Kihonda Ward, where cultivation of permanent crops (e.g. oranges, coconut) and livestock keeping is carried out. The large scale farms are cultivated in Mzinga Ward where rice is grown during wet seasons and vegetables during dry seasons by using traditional irrigation. Cultivation of banana, oranges and upland or lowland rice are grown in Bigwa and Kingolwira Wards.

The cultivation of rice and vegetables is also carried out in Mwembesongo, Kihonda, Kichangani, and Mazimbu Wards. There are sisal farms owned by institutions like prison department and Tungi Sisal Estate. The Sokoine University of Agriculture is another institution that owns a farm for growing horticultural crops, pastures, and livestock grazing.

(d) Impact of Urban Farming Activities

Due to improper agriculture practices there are many impacts which are;

- Soil erosion from Uluguru Mountain due to "sesa" type of cultivation,
- Contamination of water sources due to heavy inorganic and pesticides application to vegetables carried out in Mlimani Wards,
- Water loss due to water run-off due to 'sesa' type of cultivation on steep slopes,
- Deforestation of the Natural forest reserve for the need of fertile soils for Banana plantation

(e) Livestock keeping

About 8.2% of the population is engaged in livestock farming. According to the data available, only few households keep livestock and many of them practice indoor livestock keeping or zero grazing. In recent years, the number of livestock, especially dairy cattle, has increased. However, free grazing is the most serious problem for cattle keepers. Table 10 below shows livestock population; -

Table 10: Number of Livestock:

N0.	TYPE OF LIVESTOCK	NUMBER
1.	Indigenous Cattle	6,954
2.	Dairy Cattle	3,523
3.	Goat (dairy)	272
4.	Goat Local	4,532
5.	Poultry	2,450,162
6.	Dogs	10,800

(f) Fisheries

In case of fisheries activities, in the Municipal, there is about 26 manmade fish ponds, which are located in various wards including Bogwa, Magadu, Mindu, Mazimbu, Mlimani, Boma and Kingolwira. Some ponds are used to raise fingerlings and some for production of mature fish for consumption and for sale. About 1890 kgs of fish are produced per month, which has a value of about Tsh. 7,560,000/=.

(g) Natural Resources

Natural resources sector is comprised of various sub-sectors including forestry, fisheries, bee-keeping and wildlife. The sector is very important in the contribution to social and economic development of the municipal. It also plays an important role in the maintenance of climate stability, conservation of water sources, soil fertility,

controlling land erosion, and providing source of wood fuel, industrial materials and non-wood products such as honey and bee-wax.

(h) Forestry

The forestry sector plays an important role in maintaining ecological balance, soil protection from erosion and conservation of water, wildlife and our livelihood. Moreover, forests are a source of industrial raw materials and provide wood and non-wood products such as honey and beeswax. Thus, failure to maintain or improve forest resources eventually will lead to problems of unsustainable livelihood. Human activities such as expansion of human settlements and agriculture activities are the main causes for deterioration of forest cover in the municipal. Due to this deterioration, the municipal remains with forests cover of 26,400 hectares.

5.11 ENERGY

Resident of the Municipality depend on different sources of energy as; electricity, kerosene, charcoal, fire wood, solar, etc. The main source of power for lighting, business and industry is electricity, which is generated, transmitted and supplied by TANESCO.

78% of the Municipal households depend on charcoal or fire wood as their main source of energy, and the remaining complement charcoal and firewood with either electricity or kerosene.

5.12 EDUCATION AND HEALTH SERVICES

5.12.1 EDUCATION

The key sector Institutions are Pre-primary classes, primary schools, [normal and special] Secondary schools, Vocational Centers, Specialized Training Centers, Collages and University as shown in table 11 below.

Table 11: Education Institutions:

EDUCATION FACILITY		OWNER	
CATEGORY	No. OF FACILITIES	GOVERNMENT	NON - GOV
Pre-Primary schools	81	56	25
Primary schools	87	62	25
Secondary schools	49	23	26
Vocational Centers	03	02	01
High Institution (Universities)	04	02	02

Special education for disabled	11	10	01
Teacher Trainin-g Collage	1	1	0

Source: Municipal Education Office 2015

5.12.2 HEALTH SERVICES

Health department is among the most crucial area of concern in the provision of social services in the municipality. According to the Local Government Reform Program which begun in 2000, the vision of Health department is focused on the riskiest health hazard areas in the municipality. The department is divided into two major sections:

- Preventive
- Curative

Table 12: Health facilities:

CATEGORY OF SERVICE	OWNER				TOTAL
	GOVT	PRIVATE	PARASTATAL	OTHERS	
Dispensaries	20	6	3	15	44
Health centers	04	4	1	4	13
Hospital	02	0	01	0	03
Pharmacies [PtI]	0	12	0	0	12
Pharmacies [PtII]	0	118	0	0	118

Source: Municipal Health Office.

Table 13: Endemic diseases:

No.	TYPE OF DISEASE
1.	Malaria
2.	Acute Respiratory Infection
3.	Skin Diseases
4.	Other Diagnosis
5.	Intestinal Worms
6.	Pneumonia
7.	Oral Conditions
8.	Pelvic Infection
9.	Anaemia
10.	Eye Conditions

Epidemic diseases

The major epidemic diseases prevailing in the Municipality are:

- Measles
- Dysentery
- Viral Eye infection
- Rubella
- Cholera

5.13 SOLID WASTE MANAGEMENT

Solid waste is generated in different categories from various sources as follows:

- Household waste
- Commercial waste
- Building materials waste
- Worn out motor vehicles
- Industrial waste

Solid waste is disposed off by several methods. 45% of households bury their solid waste while 55% is disposed at Kihonda dump site. It is estimated that there is a total of 250 tons of waste generated per day. Challenges include shortage of skip buckets, vehicles and funds for encountered operations and maintenance.

6.0 STAKEHOLDERS' PARTICIPATION, ISSUES AND CONCERN

6.1 INTRODUCTION

Stakeholder's participation and involvement is an important part in the EIA study as well as general environment assessment process. Section 89 of the EMA No. 20 of 2004 emphasizes the importance of stakeholder involvement and provides guidance on public participation issues and states its importance in the assessment studies. Regulation 17 of the EIA and Audit Regulations provides further directives and procedures for public participation in decision making processes and management of the proposals undertaken.

Meaningful interactive participation provides opportunity for cooperation and coordination within and between government and other actors. It helps to harness traditional knowledge, improve information flow between actors, and contributes to understanding, empowerment and ownership of a project. It improves the implementation process for example quality of mitigation and monitoring plans, as well as enhancing transparency, capacity building, and good governance principles (Abaza, 2003). During the EIA study, stakeholders involved includes different government institutions and agencies, beneficiaries, private sector, individuals, and all other formal and informal groups associated with the project.

6.2 STAKEHOLDER IDENTIFICATION AND PARTICIPATION

Stakeholder participation involves identification of people with interest in the outcome of the project whether positive or negative, and participates in decisions, planning and management of the proposed development. Stakeholder analysis in relation to the project activities, helped in identification of the stakeholders who were then consulted. After the stakeholder analysis, a list of stakeholders to be consulted, informed about the project and their views and their concerns gathered was prepared. In addition, various authorities that influence the implementation of the activities of the project also formed part of stakeholders.

After identification of the stakeholders, a participation matrix was prepared and initial contact was made with various officials at the region and municipal level to secure appointments. This was then followed by visits to various stakeholders with the purpose of informing them about the project and its potential negative and positive impacts. Interviews and general meetings were held with key stakeholders to provide information but also to collect stakeholders' views and concerns regarding the project.

6.3 STAKEHOLDERS' VIEWS AND CONCERNS

Most stakeholders consulted, supported the proposed water and sanitation project. The stakeholders' support is based on the grounds that the project will reduce the long-lasting problems caused by shortage of clean and safe water as well as adequate sanitation in the Municipality. Stakeholders also expressed their expected positive and negative impacts associated with the project (summary of the key issues raised and noticed during the EIA Study (field works and interviews with stakeholders) are outlined here below and presented in details in Annex I of this report).

6.3.1 CONSULTATION WITH GOVERNMENT OFFICIALS, AUTHORITIES AND INSTITUTIONS

Government officials from the Municipality of Morogoro, MORUWASA, Wami/Ruvu Basin Authority, and Institutions such as TANESCO were consulted and the following key issues and concerns were documented.

- The proposed location for New Wastewater Stabilization Ponds at Kihonda is full of settlements and all key services such as electricity, water supply and access roads are available. The new area at Kipera is proposed for wastewater stabilization ponds. Processes are underway for MORUWASA to get permission from the Municipality to utilize the proposed pond area.
- Industrial Waste stabilization ponds at Kihonda are not mentioned in the proposed project and they are in bad condition. The ponds are not maintained and the untreated smelling effluents are passing through residential areas into River Ngerengere. Immediate action such as rehabilitation of the ponds is required to save the environment, the people and living organisms depending on River Ngerengere.
- There is encroachment in the sources of water in Mindu dam. Settlements and agricultural activities are carried out within the 500m surrounding the dam
- Most of the rivers around Mindu catchment have been encroached despite the fact that no activity is supposed to be undertaken within the minimum of 60m from those rivers.
- Comments from some stakeholders showed that Mzinga wastewater ponds are releasing effluents into the dam. During full EIA this was checked by visiting Mzinga waste stabilization ponds. Domestic wastewater is treated in these ponds unlike the comments that industrial waste was being released. Follow up was also made to the laboratories that monitored the dam water and it was confirmed that no big threat was identified with regards to contamination of the dam based on the monitored parameters. Parameters monitored are pH, Color (mg/l PtCo), turbidity (NTU), T.D.S. (mg/l), E.C. (µs/cm), Alkalinity (mg/l), Chloride (mg/l), T.

Hardness (mg/l), Calcium (mg/l), Magnesium (mg/l), Fluoride (mg/l), nitrate (mg/l), Nitrite (mg/l), Iron (mg/l), Manganese (mg/l), Sulphate (mg/l), Phosphate (mg/l), Free chlorine (mg/l), Total Chlorine (mg/l), Faecal coliform (No. of C/ 1OOML)

- Water treatment in some periods of heavy rainfall is not effective at Mafiga water treatment plant as some of the chemicals used during times of very high turbidity such as Aqua Floc are expensive and not always available, thereby making the raw water to be diverted into Ngerengere river. Up to turbidity of 3000NTU, Mafiga can effectively treat the incoming raw water and turbidity of treated water is usually within acceptable standard based on the water quality tests obtained from MORUWASA. If raw water turbidity is above 3000NTU, the treatment plant is temporarily shut down due to unavailability of Aqua flocs to aid in better coagulation.
- Currently, the Waste stabilization ponds at Mafisa are not operating efficiently as required due to accumulation of sludge. Desludging is therefore necessary to ensure that these ponds operate efficiently as intended. Solid wastes that come with the influents from households/customers is another challenge being faced by operators and need to be mitigated.
- Vituli intake point has been encroached, houses and sanitary facilities have been constructed close to the river banks and as agricultural activities are conducted in the slopes of the mountain, all of which contaminate the water source.
- The place earmarked for construction of water tank at Kingolwira is reported to be a private land. Relevant procedures need to be undertaken in order to procure the said site before implementation of the works.
- The area within the vicinity of Mambogo water treatment plant intake is also encroachment by people's settlements and various activities are conducted along the valley.
- Environmental Audit for the four industries located at Kihonda should be undertaken by the enforcement authority to determine socio-economic and environmental condition of the industries and whether pre-treatment system located inside the industries are working.
- Catchment management should be a key focus to protect the main sources of water in Morogoro Municipality and should be adopted in the project planning. For instance, establishing awareness campaign to conserve the water sources
- Industrial waste stabilization ponds at Kihonda and Vituli Water Intake Point and its surrounding catchment areas should be included in the environmental audit and monitoring. These components had not been included in the proposed expansion works but it is recommended that Industrial Waste Stabilization Ponds at Kihonda discharging raw wastes into Ngerengere River should be looked onto as far as environmental safety is concerned. Rehabilitation should be done on the

ponds to make them function effectively so that the effluents being discharged to the river meet required environmental standards.

Mambogo Water system is working efficiently and no expansion works are envisaged but currently, the area around the intake is encroached by human activities and settlements. It is therefore proposed that measures are undertaken like fencing the intake to protect it from future activities upstream. Mambogo Water Treatment Plant is newly rehabilitated plant. Full EIA was carried out under MCA-T project.

Vituli water treatment is also encroached by residents and human activities risk polluting the existing intake. No expansion works are proposed at Vituli system but it needs protection to make it sustainable in the long run.

- Replacement of old pipes with new one as well as extension of water supply in CBD, Boma road, Rock garden and Kilakala might affect some of the existing infrastructures in these areas.

6.3.2 CONSULTATION WITH WARD AUTHORITIES, INDIVIDUALS, FORMAL AND INFORMAL GROUPS

Ward officials from selected ten wards expected to be more affected by the project, individual communities, formal and informal groups were also consulted and the following key issues and concerns were documented.

1) Mafisa Ward

Comments and concerns:

- The ward is positive about the project since there is assurance of portable water service since there are some streets that are not connected to the current water system. Employment is also viewed as a benefit to the ward during construction.
- Areas like Mambi, Sina, Whitehouse, Mafisa, Nyerere streets have high water table hence challenges with pollution by sanitation systems. The wish of the ward is to be connected to the Mafisa sewerage system at affordable cost. Currently, the connection fee is charged at 20% of the total cost of materials required for the connection
- There was also a concern as to whether their houses will be relocated as a result of the project.
- Some water pipes are bursting and it takes long to fix hence a lot of water leakages.

Expectation

- Ward members expect that broken chambers in the current sewerage system shall be fixed during this dry season, since they overflow during the rainy

season and resulting in bad odour and contamination of water sources which leads to rampant diseases.

- Members expect MORUWASA to supply quality pipes and durable ones to avoid frequent leakages. Currently, low quality pipes are sometimes supplied by the individual who needs to be connected to the water system.
- Ward members expect that Mafisa Waste Stabilization Ponds shall be cleaned to reduce bad odour and chances of diseases.
- Individual connection to the sewerage system to be done with minimum fee and the remained balance to be done during billing

2) Mafiga Ward

Comments and concerns:

- Ward members were positive about the project since there is a big water shortage and the project will ensure availability of portable water services almost daily and creation of employment opportunities.
- Water pipes are laid at minimum depth and are broken when the grader is levelling the streets roads hence excessive leakages.
- Meters are stolen nearly every day and 150,000 Tsh needs to be paid to be reconnected. Even when no meter is replaced, the bill is still presented to the user.
- With affordable connection fee Mafiga A, B, Zahanati, Kidongoro, Ngazengwa and Madox streets need to be connected to Mafisa sewerage system.
- Mzinga WSP and nearby villages need to be investigated with regards to pollution of Mindu Dam.

3) Mindu Ward

Comments and concerns:

- Some streets in Mindu ward such as Mikoroshini and Kasanga are within dam catchment area (500m) and full of residential houses (more than 100), farms that may need to be demolished. The residents here are seeking for compensation
- In 2002 people were relocated from the dam and fishing was banned, sand mining was not permitted. These people were compensated.
- Despite the fact that Mindu is the source of water for the big population in Morogoro Municipality, except Kasanga and Mgaza streets, most of Mindu Ward residents are complaining that they are not connected to MORUWASA water services since the Dam was constructed in 1984. Therefore, some people are not interested with the project.

- Other sources of water at Mindu ward are dug wells.
- It was reported that when there is a leakage of water pipes, repair by MORUWASA takes long.
- Apart from water supply, MORUWASA should contribute to other community services like construction of health facilities or schools.
- Mindu residents were ready to avoid encroaching into the Dam for water services only if the alternative water source will be provided by MORUWASA eg connecting them to the existing water distribution system.
- The tarmac road Morogoro to Iringa is also within the dam catchment
- This project should be implemented without delay.

4) Boma Ward

Comments and concerns:

- Mindu dam was constructed in 1984 to supply water for industrial purposes, later on the service was expanded to Municipal residents.
- Some Ward members reported that water supplied by MORUWASA is dirty and smells sometimes
- Some residents claim that the Dam is contaminated by chemicals (there is no justification or proof of this, however)
- People on the higher sides of the dam to be given awareness on how to protect the water source by planting trees
- People were concerned with the alternative source of water that will be used when the dam is under construction
- Other sources of water to be investigated eg wells

Conclusion

This project will cause positive impact if MORUWASA will implement this project without delay eg employment, portable water, good health.

5) Mlimani Ward

Comments and concerns:

- Their water source is Mambogo intake and not Mindu dam
- Mambogo intake is flowing throughout the year
- The Mambogo intake is an old source of water, its operation started in 1976 before Mindu dam and was operating well. After major rehabilitation (2014) that is when Mlimani ward is receiving water by rationing not as before. They sometimes receive once in three weeks.
- Their concern is also in the implementation of the water rationing which is not systematic
- The pumps stop pumping when muddy water enters the system and when there power outage.

- Some residents questioned the new project (expansion of Mindu) if it will succeed if the Mambogo did not. They don't think this project will benefit them, they only need investigation to be done at Mambogo intake to rectify the problem they are now facing.
- The flow meters are blown by wind instead of water and the bill rises therefore they preferred flat rate to be used for billing more than flowmeters

6) Mwembesongo Ward

Comments and concerns:

- They receive water from the Mindu dam by rationing
- They are not satisfied with the quality of water and its smell hence rampant diseases
- They were also concerned if the water prices will rise upon completion of the project.
- The pace of the project to tally with the pace of rehabilitation of old water supply infrastructures since some pipes are leaking continuously.
- This project will cause positive impact eg employment, portable water, good health

7) Kilakala Ward

Comments and concerns:

- Their source of water is Mambogo intake and not Mindu dam
- Their tanks are at Kola under MORUWASA.
- They were interested to be connected to the sewerage system at Mafisa Waste Stabilization Pond
- If the Mindu dam project will be implemented they want water storage tank at Kilakala to suffice their water demand
- Also deep wells should be an alternative from MORUWASA since it is used by different individuals.

8) Kingolwira Ward

Comments and concerns:

- Residents are not consulted by MOORUWASA during water project decisions
- Water supplied by MORUWASA is not clean and is coloured.
- Water shortage causes residents to use water from dug wells
- Water Kiosks for Vituli intake do not supply water
- Residents reported that they contributed financially for the Vituli water project but the project is not handed over to them to date (MORUWASA is operating it).
- Water pipes are leaking and MORUWASA takes long time to fix, hence affecting the supply.

- Pastoralists activities and burning of trees for charcoal in restricted areas should be banned.

Conclusion

- Water storage tank at Kingolwira was earmarked to be constructed at the area owned by Mr Jambo (residents reported that the area belongs to Morogoro District council). Instead MORUWASA should liaise with the ward for suitable area within the Municipality
- There are suitable areas at Kingolwira for boreholes construction if investigation is done to meet the water demand
- This project will cause positive impact especially if the storage tank constructed at Kingolwira will meet their water demand, others employment, portable water, good health.
- They need to be connected to the sewerage system but Kipera Waste Stabilization Ponds will be uphill and Kingolwira downhill therefore not suitable for them.

9) Kihonda Ward

Comments and concerns:

- Residents acknowledge shortage of water in their ward
- They have tank but no water therefore needed pumping to be done to their tank at Kiegea A from the Mindu dam
- Residents of Magereza, Kihonda ward get water by rationing.
- Waste water from Sisal factory with bad smell is disposed into Ngerengere river and when used cause itching of the skin
- In projects like this open trenches are remaining uncovered for long time and cause accidents to passerby residents,
- Laborers need timely and fairly payments
- Meter readers are just estimating the bill
- Nguvukazi and Kiegea have water shortage need to be considered in this new project

Conclusion

- This project will cause positive impacts in their ward eg portable water and employment
- When the handing over of the project is done the authority, concern should continue monitor its implementation for its sustainability
- The reported leakages to be addressed in timely
- HIV/AIDS awareness to be conducted during implementation of the project

- Emergency department should be established for Sewerage system to take care of emergencies eg broken of sewage chambers

10) Sabasaba Ward

Comments and concerns:

- Since the storage tank was removed from Sabasaba ward, residents acknowledged that their ward has faced shortage of water.
- Their water meters are regularly stolen and they are replaced with old ones when payment is done.

Conclusion

- This project will cause positive impacts in their ward.
- Human activities around the Mindu dam catchment should be stopped since that will sustain the project.

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They were positive about the Mindu Dam water project, but their concern was more effort to be on the conservation of water sources and their catchment areas than the expansion of the Dam height.

7.0 IMPACTS IDENTIFICATION AND ANALYSIS

7.1 IMPACT IDENTIFICATION

Impact identification in the EIA seeks to ensure that all potential significant impacts are identified and addressed. Several 'tools' are available to assist in impact identification. The simplest, and most frequently used, is a checklist of impacts. In this EIA simple checklist integrated into a matrix of issues /impacts matched with various project activities in various phases were used. The checklist provides list of potential impacts based on project activities in various phases, the magnitude, extent and duration with which the area will take to recover. The matrix was used to determine the magnitude, extent and severity of the impacts. The most important issues and concerns that provide basis for further analysis of significant impacts were grouped together basing on project phases - construction, operation and decommissioning as detailed below.

Impacts associated with Construction phase

The following impacts are anticipated during the construction phase of the project.

(a) Damage to road pavements and building structures due to excavation of water supply and sewer pipeline trenches.

(b) Soil erosion and sedimentation of drainage systems due to excavation of water supply and sewer pipeline trenches and other earthworks.

(c) Disruption of public service utilities due to excavation of water supply and sewer pipeline trenches.

(d) Air pollution due to emission of dust from soil excavations, stockpiling of soil materials and emission of exhaust fumes from heavy construction machinery/equipment and vehicles.

(e) Disruption of traffic flow and increased risk of traffic accidents due to construction of water supply and sewer pipelines and movement of heavy trucks to and from the WSP.

(f) Creation of noise nuisance due to the use of noise creating equipment like jack hammers near residential areas.

(g) Construction related risks or accidents due to operation of heavy construction equipment/machinery.

(h) Increased opportunities for employment and other economic activities linked to project development.

(i) Increase of income for local community, especially youth and women by selling food and other goods to construction workforce.

Impacts associated with Operation phase

The following were identified as impacts that might occur during the operation phase:

a) Risk of ground and surface water pollution due to seepage and overflow of raw sewage from WSP.

b) Creation of odour, nuisance and visual impact due to emission of odour and visibility of WSP, respectively.

c) Creation of damage on WSP by toxic industrial effluents.

d) Risk associated with raising height of Mindu Dam,

e) Occupational health and safety risks due to operation of WSP by workers;

f) Sedimentation and water pollution in the Mindu Dam due to cultivation activities on the upper catchments.

g) Reduced incidence of water borne diseases due to improved safe water supply and sanitation conditions in the project areas.

h) Reduced ground and surface water pollution as a result of improved sewerage system.

i) Reduced dependence on pit latrines and septic tank systems on areas with high water table, hence reduce health hazards in the serviced areas

j) Improvement of receiving water quality, hence providing better habitat for aquatic flora and fauna, as well as increase in beneficial use of receiving waters.

k) Change in the type and volume of waste generation

l) Change of norms, values and life style arising from increased incomes and increased population.

m) Changes in levels and types of disease and human health including spread of HIV/AIDs due to increased population in the municipality due to improvement of services and industrialization.

n) Change in population level due to influx of people looking for work and causing pressure to social services.

o) Increased opportunities for employment and other economic activities linked to project development.

p) Increased benefits to MORUWASA, local and national economy resulting from revenue generation, increased taxes, provision of goods and services to the community and others people benefiting from auxiliary activities.
q) Improved social services such as provision of safe and clean water for drinking, health services and other related facilities.

Impacts associated with Decommissioning phase

The following impacts are likely to occur during Decommissioning phase

a. Vibration and noise due to demolishing of structure, movement and trampling of machines and trucks carrying debris.

b. Hazards and risks associated with un-rehabilitated soils, pollution, and dust.

c. Change in the type and volume of waste generated.

d. Improved in scenic quality and in view shed due to re-vegetation and landscaping activities.
e. Reduced income to locals and national economy due to demolition of the project and loss of job and auxiliary activities.

f. Reduction of the quantity and quality of water supply in the municipality and and sanitation services

7.2 IMPACT ANALYSIS AND EVALUATION

Evaluation of impact significance is critical component in Impact assessment. It provides a key to developing mitigation/enhancement measures to deal with the impact and selecting project alternatives. Determination of the significance of the impact contributes to internalization of environmental costs in the overall project costs. Mitigation measures are developed for impacts that are considered negative, while enhancement measures are developed for impacts that are considered positive.

In evaluation process impacts were considered significant if they met the following criteria:

- The magnitude and likelihood of the impact and its spatial and temporal extent;
- The likely degree of recovery of the affected environment;

- The value of the affected environment;
- The level of public concern;
- Political repercussions of the impacts;
- Environmental standards and compatibility with identified impacts.

Similarly, the Impacts are likely to be significant if they:

- Are extensive over space and time;
- Are intensive in concentration or in proportion to assimilative capacity;
- Exceed environmental standards or thresholds;
- Do not comply with environmental policies, land use plans, sustainability strategy;
- Adversely and seriously affect ecologically sensitive areas;
- Adversely and seriously affect heritage resources, other land uses, communities and/or indigenous peoples, traditions and values.

Several methods are commonly used in evaluating significance of impacts. Some of these include comparison with applicable environmental standards, and use of the matrices with ratings to determine which impacts are significant. In this EIA the following ratings have been used:

- +2 High positive impacts
- +1 Minor positive impacts
- 0 No impacts
- -1 Minor negative impacts
- -2 High negative impact

Mitigation and enhancement measures are developed for significant impacts that were rated +2 and -2 whereas those impacts that were rated at -1 and +1 are discussed under cumulative impacts since they could be insignificant where they stand alone but cumulatively they produce significant impact.

Table 14: Impact correlation matrix for the water supply and sanitation project

	MOBILIZATION PHASE				CONSTRUCTION PHASE									OPERATION PHASE							DECOMMISSIONING PHASE		
	Obtaining of permits and other documents	Design of the structure	Recruitment of labour force	Mobilization of materials	Site clearing and levelling (mafinga and kipera)	Establishment of workers area of operation	Construction of transmission lines	Construction of wastewater infrastructures/ponds	Construction of the basement structure (Mindu dam and mafinga)	Construction of the treatment plant and tanks	Solid waste management	Liquid waste management	Construction of storage facility	Power generation	Water supply and management	Liquid waste management	Organic waste management	Solid waste management	General operation of the structures	Transportation facilities	Demolition of the structures	Remediation of the site	Laying off labor force/workers
IMPACTS RELATED TO PHYSICAL ENVIRONMENT																							
1. Increased Surface run off due to construction activities and transmission lines	0	0	0	0	-1	0	-1	-1	-2	-2	0	0	-1	0	0	0	0	0	0	0	-2	-1	0
2. Increased noise and Vibration	0	0	0	-1	-2	0	0	0	-2	-2	0	0	-1	-2	0	0	0	0	-1	-1	-2	-1	0
3. Change in surface and Ground water quality	0	0	0	-1	-2	0	-1	-1	-1	-2	-2	-2	0	0	-1	-2	-2	-2	0	0	-1	-1	0
IMPACTS RELATED TO ECOLOGICAL ENVIRONMENT																							
4. Loss of vegetation (flora and fauna)	0	0	0	0	-2	-2	-2	-2	0	-1	0	0	0	0	0	0	0	0	0	0	+2	+2	0
IMPACTS RELATED TO LAND USE & LANDSCAPE																							
5. Air pollution	0	0	0	-1	-1	-1	0	0	-1	-1	-1	0	0	-2	0	0	0	-1	0	-1	-2	-1	0
6. Change in landscape and scenic quality	0	0	0	-1	-2	-1	-1	-1	-2	-2	-1	-1	-1	-1	-1	-1	-1	-1	0	0	-2	-2	0
7. Increased pressure on local resources	0	0	0	-2	-1	-1	+1	+1	+2	+2	-1	-1	0	-2	+2	-1	-1	-1	0	0	+1	+2	+2

	MOBILIZATION PHASE				CONSTRUCTION PHASE									OPERATION PHASE							DECOMMISSIONING PHASE		
	Obtaining of permits and other documents	Design of the structure	Recruitment of labour force	Mobilization of materials	Site clearing and levelling (mafinga and kipera)	Establishment of workers area of operation	Construction of transmission lines	Construction of wastewater infrastructures/ponds	Construction of the basement structure (Mindu dam and mafinga)	Construction of the treatment plant and tanks	Solid waste management	Liquid waste management	Construction of storage facility	Power generation	Water supply and management	Liquid waste management	Organic waste management	Solid waste management	General operation of the structures	Transportation facilities	Demolition of the structures	Remediation of the site	Laying off labor force/workers
8. Loss of land and other properties	0	0	0	0	-1	0	-2	0	-2	-1	0	0	0	0	0	0	0	0	0	0	0	0	0
9. Change in volume and types of waste	0	0	-1	-1	-2	-2	-1	-1	-2	-2	-1	-2	-1	-1	0	-2	-2	-2	-1	-1	+2	+2	+2
10. Soil pollution	0	0	0	-1	-1	-1	-2	-2	-2	-1	-1	-2	-1	-2	-1	-2	-2	-2	-1	0	+1	+1	+1
IMPACTS RELATED TO SOCIO-ECONOMIC ENVIRONMENT																							
11. Increased Noise levels	0	0	0	-1	-2	-1	-1	-1	-2	-2	0	0	-1	-2	0	0	0	0	-2	-2	+2	+1	+1
12. Increase in HIV/AIDS and other diseases	0	0	-1	0	-1	-2	0	0	-2	-2	-1	-1	0	-2	-1	-1	-1	-1	-2	0	+2	0	+2
13. Change in level of crime, norms and local values	0	0	-1	-1	0	-2	0	0	0	-1	0	0	0	-1	0	0	0	0	-2	-1	0	0	+2
14. Increased population size	0	0	-1	0	0	-2	0	0	0	-2	0	0	0	0	0	0	0	0	-2	-1	0	0	+1
15. Increased pressure on social services	0	0	-1	0	0	-2	0	0	0	-2	0	0	0	-2	0	0	0	0	-2	0	0	0	+2
16. Change in levels Employment	0	+1	+	+1	0	0	0	0	0	+2	+1	+1	+2	+2	+1	+1	+1	+1	+2	+2	-2	-1	-2

	MOBILIZATION PHASE				CONSTRUCTION PHASE									OPERATION PHASE							DECOMMISSIONING PHASE		
	Obtaining of permits and other documents	Design of the structure	Recruitment of labour force	Mobilization of materials	Site clearing and levelling (mafinga and kipera)	Establishment of workers area of operation	Construction of transmission lines	Construction of wastewater infrastructures/ponds	Construction of the basement structure (Mindu dam and mafinga)	Construction of the treatment plant and tanks	Solid waste management	Liquid waste management	Construction of storage facility	Power generation	Water supply and management	Liquid waste management	Organic waste management	Solid waste management	General operation of the structures	Transportation facilities	Demolition of the structures	Remediation of the site	Laying off labor force/workers
			1																				
17. Increased benefit to Government	0	0	+1	+1	0	0	0	0	+2	+2	+1	+1	0	+2	0	+1	+1	+1	+2	+2	-2	-2	-2
18. Increased benefit to local economy/ communities.	0	0	+1	+1	0	0	+2	+2	+2	+2	+1	+1	0	+2	+2	+1	+1	+1	+2	+2	-2	-2	-2
19. Change in the quality of existing infrastructure	0	0	0	-1	-2	0	-1	-1	-2	-2	-1	-1	0	-1	-1	-1	0	-1	0	0	-2	0	0
20. Increased risks and hazards	0	0	0	-1	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-1	-1	0

SIGNIFICANT IMPACTS OF THE PROJECT WITH ENHANCEMENT AND MITIGATION MEASURES

Following the analysis made in Section 7.2 and as presented Matrix Table, significant impacts were identified and assigned category -2 and +2. These impacts both negative and positive are further discussed below and mitigation and enhancement measures are proposed for each of them in the tables below.

7.2.1 THE POSITIVE (BENEFICIAL) IMPACTS ASSOCIATED WITH THE PROJECT AND ENHANCEMENT MEASURES

The table below present the positive (beneficial) impacts associated with the project and its enhancement measures

Table 15*: Positive Impacts and Enhancement Measures.*

POSITIVE IMPACTS	ENHANCEMENT MEASURES
Creation of temporary employment to the local people during construction	• Give employment priority to local people employment (men and women) during construction phase • Offer project employment opportunities to men and women during operation, encourage women to apply and select candidates according to their competencies.
Increased income generation by local people, especially women and youth by selling food stuffs to construction workers	• Give preference to getting service from the local inputs (food, basic materials, etc. • Create enabling environment for food vendors through construction of temporary shelters with water supply and sanitary facilities.
Reduced incidence of water borne diseases due to improved safe water supply and sanitation conditions in the project areas.	• Intensify awareness and education campaigns on hygiene and sanitation practices among the local residents • Promote household connections to sewerage system
Improved ground and surface water quality	• Promote awareness among the local residents to protect ground and surface water sources against pollution.

POSITIVE IMPACTS	ENHANCEMENT MEASURES
Reduced dependence on pit latrines and septic tank systems on areas with high water, hence reduced health hazards in the serviced areas	• Encourage local residents in areas with high water to connect to sewerage system. • Promote awareness campaigns among the local residents to discourage people from throwing non-degradable materials in flush toilets. • Enforce legislation to discourage people from stealing manhole covers. • Use non-metallic covers for manholes and sewer chambers to discourage unscrupulous people looking for scrap metals.
Improved receiving water quality, hence providing better habitat for aquatic flora and fauna, as well as increase in beneficial use of receiving waters.	• MORUWASA should intensify effluent quality monitoring to ensure that effluent from WSP and Sludge meets the required standards to warrant its use for agricultural purpose.

7.2.2 THE ADVERSE (NEGATIVE) IMPACTS ASSOCIATED WITH THE PROJECT AND MITIGATION MEASURES

The table below presents adverse (negative) impacts associated with the project which will result from construction, operational and decommission activities. The potential negative impacts that are likely to occur from this project including its mitigation measures are as follows:

Table 16: Negative Impacts and Mitigation Measures for the project

POTENTIAL IMPACTS	MITIGATION MEASURES
Loss of land and other properties	• Survey and mapping of existing properties • Identify pipelines route that are confined along existing road or tracks • Pay compensation to the affected people
Damage on road pavement and building structures	• Coordinate with road authorities (E.g. TANROADS) to identify affected roads to plan restoration of damaged road pavements • Properly plan construction works to avoid unnecessary crossings on important roads, under building structures and storm water drainages • Develop construction management plan during detailed design • Design should focus on improving existing roads leading to construction sites within the right -of-way

POTENTIAL IMPACTS	MITIGATION MEASURES
Destruction of public service utilities	• Arrange coordination and mapping of all utilities must be arranged between the Contractor and responsible authorities (E.g. TANESCO, TTCL, etc.) prior to detailed design and construction works. • Properly plan construction works to avoid unnecessary crossings under building structures, channels and important roads. • Develop emergency measures m consultation with the relevant authorities.
Air pollution	• Covering of trucks hauling soils and dusty materials with tarpaulins during transportation. • Maintaining moisture on construction materials, minimizing on-site storage time of construction materials and covering exposed soils or storage areas • Selecting transportation routes to minimize impacts on sensitive receptors. • Watering of construction sites to reduce dust emission.
Creation of noise nuisance	• Avoid use of high pitch noise creating equipment (E.g. Jack hammer) in breaking concrete or road pavement. Instead, employ manual labour using shovels and pick axe. • Limit use of noise creating or noisy construction activities in residential areas during night hours (18:00 to 6:00). • Provide ear plugs to construction workers and avoid
Soil erosion and sedimentation of storm water drainage/ watercourses	• Immediately resurface and stabilize exposed surfaces. • Plant grass on exposed surface around WSP and Sludge ponds • Plan disposal of surplus soils and demolition
Disruption of traffic flow and increased risk of accidents	• Enforce traffic management plan in collaboration with Traffic Officers • Deploy flag personnel to guide traffic movement during critical points • Use signboards to warn motorists

POTENTIAL IMPACTS	MITIGATION MEASURES
Construction related accidents	• Ensure that machinery/equipment are operated by trained personnel • Provide First Aid Kit on-site administered by a qualified person. • Provide personal protection equipment (PPE)
Risk associated with raising the height of Mindu Dam	• Extending the slopes (flatten the slopes) further in the downstream face • Verifying the Upstream and Downstream shoulders rock material with respect to their durability aspects and soundness to accommodate the loads from raising the dam. • Ensure that the minimum internal freeboard for the core is not less than 1 meter or reasonable enough to stop any case of internal overtopping and at the same time, maintain sufficient cover above the core with well controlled material that would not allow any internal disruption due to water evaporation. • Carefully stripping the downstream face during low water levels before the addition of the new zones. • Installation of well-designed monitoring system before and during construction
Creation of odour nuisance	• Ensure proper operation and maintenance of WSP. • Plant trees to create green belt as buffer zone around WSP to minimize visual impact. • Preference should be given to indigenous trees with non-- destructive good rooting system. • Assess direction of odour nuisance by running a simulation model based on wind direction.
Occupational health and safety risk	• Regularly check workers' health • Provide vaccine to prevent spread of communicable diseases. • Establish and operate dispensary with sufficient medicine and equipment. • Provide First Aid Kit complete with medicines and managed by qualified personnel Provide regular training to workers on occupational health and safety. • Construct fence around WSP to prevent encroachment by nearby residents, especially children. • Put warning signs to discourage trespassing by people into WSP and Sludge ponds.

POTENTIAL IMPACTS	MITIGATION MEASURES
Risk of ground and surface water pollution	• Construct flood protection bunds around WSP • Monitor ground water quality around the WSP by establishing monitoring boreholes around WSP for taking water samples • Develop flood-warning system and formulate emergency flood plan. • Monitoring of effluent form WSP to ensure that it meets the national standards.
Risk of damage to WSP by toxic industrial effluents	• Issue sewage discharge permits and exert tight control • Impose heavy fines for violators/ • Only pre-treated industrial effluents should be allowed to be discharged into municipal sewerage system. • Prevent discharge of hazardous waste into the Sludge ponds. • Develop monitoring programme for industrial wastewater being discharge into the sewerage system and Sludge disposal ponds.
Risk of sedimentation and water pollution in the Mindu Dam	• Promote good agriculture l practice, such as agro-forestry and contour cultivation. • Promote tree planting campaign by local people leaving on the upper catchment including tree planting campaigns. • Enforce regulations and by-laws to discourage cultivation activities around water sources and along the stream banks. • Promote the use of organic fertilizers and biological methods (e.g. pest resistance crops) for pest control by local people leaving on the upper catchment.

7.2.3 RESIDUAL IMPACTS

Vibration as a residual impact is likely to occur due to movement of heavy machine and trucks, steel dumpers, chutes, power generation, and other sources. Impacts such as shovelling, drilling, transport, and stockpiling are residue and will persist during the construction period. Similarly, movement of trucks transporting materials to the area (during construction in Mindu, Mafinga, Kipera and Kingolwira) will be part of life within the surrounding areas affecting people and the environment.

Such residual impact will only be minimized when the various mitigation measures presented above are implemented but they will not be completely eliminated until the end of the project; and some may continue for a long time thereafter.

7.2.4 CUMULATIVE IMPACTS

Noise pollution, dust, water pollution, nuisance and waste generation arising from construction activities may increase cumulatively and affect more people outside the project site. This may occur as a result of an increase in population that is moving into the project site (for instance those living surrounding Mindu dam) and workers searching for employment and other opportunities, growth of ancillary activities that may push demand for social services, generate waste, increase noise, and dust, thus compounding these environmental and social impacts from the project. Implementation of the mitigation measures discussed above will reduce the severity of these impact but many people inside and outside the project site will feel them.

8.0 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

8.1 MONITORING PLAN

Monitoring refers to the systematic collection of data through a series of repetitive measurements over a long period of time to provide information on characteristics and functioning of environmental and social variables in specific areas over time. Monitoring must include checking for effectiveness or otherwise of mitigation and enhancement measures to deal with the predicted impacts of a particular project. The EMA No. 20 of 2004 defines roles for monitoring where the National Environment Management Council (NEMC) is empowered to enforce compliance to the environmental permits (Certificate) issued prior to development and follow in monitoring to ensure implementation of the Environmental Management Plans (EMP). NEMC therefore is required to conduct monitoring activities in collaboration with relevant sectors and other stakeholders.

This chapter provide an environmental and social monitoring plan for the proposed water supply and sanitation project for Morogoro Municipality. The mitigation measures and the monitoring plan together constitute the Environmental Management Plan (EMP) for the proposed development. For the proposed project, there will be several components for monitoring that will be an integral part of the proposed development. Some of the issues for monitoring will relate to the potential for improved income and changes in life styles, increased employment opportunities and revenue. Other issues will relate to monitoring for waste management issues, water use, air/dust and noise pollution, hazards and risks, increased volume of traffic and accidents and human health and illness. The monitoring plan is provided in Table below.

8.2 MONITORING FREQUENCY AND REPORTING

Monitoring frequency is proposed for each critical parameter depending on the likelihood and level of change over time. Some parameters take longer time to show changes while others would change in very short time. For example, liquid effluents and noise should be monitored daily while others may be monitored on a monthly basis. Monitoring should at least be on quarterly basis where water treatment is needed as in this project.

Air emissions should be monitored after the air pollution control device for particulate matter (or alternatively on capacity level of less than 10%). Frequent sampling for parameters should be undertaken during start-up and continue throughout the construction and during decommissioning phase. Some monitoring may have to

continue even beyond decommissioning –for impacts such as emission from waste disposal facilities and recovery in vegetation.

Other parameters such as income, revenue, employment, changes in livelihoods, and use of the services (water, sanitation, energy) and changes in norms and values will be monitored on annual basis – so as to allow for change to take place.

Monitoring data should be analysed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions are taken. Developer is required to maintain records of emission, effluents, hazardous waste sent off site, as well as other parameters (e.g. the level of water use and sanitation), environmental and other events such as spills, fires, emergencies, accidents, and ill health that may impact on the environment or workers.

Records of monitoring results should be kept in an acceptable format an easily accessible, and information reviewed and evaluated to improve the effectiveness of the environmental protection plan. The results should be reported to the responsible authorities and relevant parties, as required by various regulations.

Table 17: Environmental and Social Monitoring Plan

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
Increased level of noise and vibration	• Ensure noise abatement measures do not exceed 85dB or as provided in this report for residential areas • Developer to ensure strict compliance with national standards on Acoustics – EMDC 6 (1733) P2-Acoustics-General Tolerance Limits for Environmental Noise. • Developer to implement regular maintenance of vehicles, machines and equipment to minimize effect on noise generation. • Developer to ensure availability and enforce use of Personal Protective Equipment (gears) such as ear protectors to workers.	-MORUWASA -Contractor -Local Governments	Quarterly	Number of reported incidences of cracks since the start of the project	-Measure Increase/decrease of existing cracks -Magnitude of displacement in mm and frequency per sec.	14678.13

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
Change in surface and ground water quality	• Undertake storage of fuels and oils in properly designed and secured areas that do not allow leakages. • Vehicle repairs and maintenance to be done in designated areas with concrete bays to prevent spillage. • Collected oil spills should be properly disposed off in designated areas or re-used.	-MORUWASA -Contractor	quarterly	-Change in water quality per unit time	-Water volume per unit time -Concentration of pollutants in grams/litter	16775.01
	• Developer to confine all construction works in designated areas	-Contractor	Daily during construction	Levels of pH and suspended solids in effluents against national standards		
	• Developer to use appropriate technologies to contain emissions and comply with Tanzania Standards.	-MORUWASA -Contractor	-Daily	Change in water quality per unit time		

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
	• Developer to ensure waste heaps is properly kept in enclosed and safe places to prevent leachates.			Level and type of waste sent off to site disposal		
	• Developer to ensure wastewater treatment plant/ponds are properly functioning to minimize polluting underground water	-MORUWASA	quarterly	Change in water volume per unit time		
Vegetation cover	• Developer to maintain green zones in areas that are not earmarked for construction. • Developer to confine construction and operation activities to core area.	-MORUWASA -Contractor	-Continuously in tandem with project operation -In tandem with project operation	Green zones earmarked	Measure/count number of new plant species planted per quadrate per year	16775.01

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
Change in landscape and scenic quality of the area	• Developer to confine all construction activities within designated core areas.	-MORUWASA -Contractor	-Quarterly during construction	Area covered	-Direct observation	12581.25
	• Developer to maintain green zones in areas that are not earmarked for construction activities	-MORUWASA -Contractor	Annually though out			
Increased air pollution (dust, fumes and exhaust)	• Developer to ensure strict compliance with national standards on air quality TS 845- 2005 and EMDC 2 (1778).	-MORUWASA -Contractor	-Quarterly for particulates matter and annually for others	-Type and levels of emissions against approved standard.		20968.76

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
	• Trucks transporting raw materials like concrete must be properly covered during transportation. • Developer to ensure availability and enforce use of Personal Protective Equipment (gears) such as ear and eye and mouth protectors to workers.		-Continuous			
Increased Pressure on local resources	• Water recycling technologies be developed to supplement the available sources	-MORUWASA -Developer	-Once per month	Amount of water recycles and used per month against approved abstraction.	-Water volume per unit time	209687.57
	• Developer to use alternative sources of energy and building materials.		annually	-Number of tenants using alternative energy		

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
Increased hazards, risks and accidents	• Developer and LGA to inform local people and the general public on the use of the existing roads by trucks to know and adhere to traffic rules and regulations. • Developer to sensitize drivers on traffic rules and regulation • Developer to ensure availability and enforce use of Personal Protective Equipment (gears) such as hard hats, gloves, welding glasses, hoods and ear and eye and mouth protectors to workers. • Provide accessible assembly points and signposts to enable workers and guests access safe areas in case accidents and evacuations. • Provide First Aid kits	-MORUWASA -Contractor -Local Government Authority	-Daily during mobilization and construction phase -Quarterly during operation phase	-Decrease in number, frequency and type of incidences -Records of compliance with measures	Direct observation	41937.51

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
	• Developer to prepare and implement through stakeholder participation a decommission Plan that provides details of how to address social, economic and environmental effects of decommissioning process. • Developer to ensure availability and enforce use of Personal Protective Equipment (gears) such as hard hats, gloves, welding glasses, hoods and ear, eye and mouth protectors to workers during decommissioning works.					
			Quarterly			
		-MORUWASA -Contractor	Monthly during decommissioning			
			Monthly during decommissioning			

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
Change in type and volume of waste	• Developer to work with LGA in providing a solid waste facility that will also cater for people outside the project site.	-MORUWASA -LGA	- Quarterly	Percentage volume of waste per unit time -Record of compliance with approved standards.	Direct observation	167750.06
	• Developer to implement a waste management programme involving sorting and disposing of solid waste in designated areas. • Developer to implement programmes aimed at recycling and re-use of waste. • Developer to ensure wastewater treatment plants are properly constructed to ensure efficiency.	-MORUWASA -LGA	**Daily** for liquid/solid waste and **monthly** for metals and others			

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
Increased Soil Pollution	• Vehicle repairs and maintenance to be done in designated areas prevent spillage. • Collected oil spills from the generators should be properly disposed off in designated areas or re-used.	-MORUWASA -Contractor	Quarterly	-Record of compliance with approved standards.	Direct observation	12581.25
Change in the quality of land	• Developer to prepare and implement through stakeholder participation a decommission Plan that provides details of how to	-MORUWASA -LGA -Developer	-Quarterly during decommission	Rate of recovery and species composition of restored areas	Direct observation	251625.08

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
	address social, economic and environmental effects of decommissioning. • Developer to provide compensation to the properties affected by the project • Developer to undertake resettlement action plan if the community living surrounding Mindu dam will required to reallocate		Once during decommissioning and once in two years after decommissioning	Rate of recovery and species composition of restored areas		
Change in the level of crime, norms and local values	• Institute proper screening of employees/labourers • Strengthen security in the project area • Developer and LGA to	-MORUWASA -LGA -Contractor	In tandem with project development phases	- Trends and type of reported crime		20968.76

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
	sensitize local communities and workers on the need to preserve and maintain valuable local cultures, norms and values. • Developer to sensitize workers to be prepared for closure of the construction works and plan new employment opportunities, including self-employment. • LGA to sensitize local people to diversify economic activities to cope with changes.	-LGA		-Records of sensitization meetings -New emerging economic activities after closure of project	-Economic Survey -Direct observation	

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
Increased Pressure on social services	• Developer to provide social services for the workers to reduce pressure on community services. • LGA to improve existing social services, in tandem with increasing population so that they offer better services to the local communities.	-MORUWASA -LGA	Quarterly	Availability of improved social services	-Direct observation -Survey	8387.5
Cost to communities (resulting from loss of	• Developer to promptly pay terminal benefits to the workers so that they can engage in other activities.	-MORUWASA	Once during decommissioning	Satisfaction of workers on terminal benefit	Survey	41937.51

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
employment, incomes and revenue to local people, district and nation).	• Developer to prepare and implement through stakeholder participation a decommission Plan that provides details of how to address social, economic and environmental effects of decommissioning. • LGA to sensitize local people to diversify economic activities to cope with changes.	-MORUWASA -LGA	Quarterly	-Records of sensitization meetings		
Increase in the spread of HIV/ AIDS and other communicable	• Sensitization of workers and local communities on pathways of HIV/AIDS and other communicable diseases	-MORUWASA -LGA -Municipal Health Officers	-Monthly at start up and quarterly during operation	-Number of HIV/AIDS cases reported after start of the project		20968.76

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
diseases	• LGA in collaboration with the developer to sensitize local people to undertake Voluntary Counselling and Testing (VCT) for HIV/AIDS and other communicable diseases.	-MORUWASA -LGA -NGOs	- Annually		-Voluntary Testing -Direct observation on the availability of improved health services	
	• The Government to improve nearby health facilities to be able to handle increasing cases of health-related problems. • Pre-employment and periodic medical examination be conducted for all workers	-LGA -MORUWASA	Annually	-Causes, numbers, frequency and type of diseases -Causes, numbers, frequency and type of diseases		

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
Improvement of social services and economic infrastructure	• Developer should work with LGA to improve existing social services so that they offer better services to the local communities	-MORUWASA -LGA	Annually	Number and quality of social services provided over time and disaggregated by facilitator (developer or LGA)	Number of new/improved social services/per population	41937.51
Change in employment levels	• Developer to ensure that local labour force with relevant skills is given priority in employment opportunities.	-MORUWASA -Contractor	-Semi-annually to check on employment records	-Number of local community employed -Number of local community holding skilled/managerial positions		125812.54
	• LGA should sensitize local people to diversify and engage in quality production of various goods and services to meet market demands.	-LGA -MORUWASA	-Quarterly	Number and type of emerging economic activities		

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
Change in life style and quality of life	• Developer should engage local people with relevant skills • LGA should work with NGOs and other institutions to raise awareness and prepare locals to take anticipated jobs.	-MORUWASA -LGA	-Rhyme with project Phases	-Records of sensitization meetings	Verification of records	16775.01
	• LGA to provide awareness on HIV/AIDS to prevent effect to local people.	-LGA -NGOs				
	• LGA and developer should sensitize local people so that they are prepared for the new development and engage in ancillary activities that will enhance their employment opportunities in activities outside the building operation.	-LGA -MORUWASA		-Records of sensitization meetings -New development plan in place		
Benefits to local community	• Priority of employment to be given to local labour force with relevant skills.	-MORUWASA -Contractor	Annually	-Number of Tanzanians in key strategic positions	-Revenue collection annually -Change in	209687.57

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
and economy	• Developer should target local products and materials.	-MORUWASA	Daily	Trends and levels of tax collection in Bagamoyo District	income levels after project implementation	
	• LGA and developer should sensitize local people to diversify and engage in quality production of various goods and services to meet market demands.	-MORUWASA -LGA	-Quarterly	-Quantities and values of materials purchased from local communities		
	• LGA to support formation and functioning of Small and Medium Enterprises (SMEs), and other services.	-MORUWASA -LGA	-Annually	-Number of Tanzanians trained Change in income levels		

Identified impacts	Mitigation/enhancement measure	Responsible institution	Monitoring frequency	Parameters	Measurement Unit/Method	Estimate cost (EURO)
	• Developer to comply with government policies and laws regarding taxation • TRA to strengthen tax collection in the emerged ancillary activities and other commercial activities • MORUWASA to strengthen the collection of water and sanitation fees monthly to maintain the services rendered	-MORUWASA -TRA -LGA	-Rhyme with project phases -Monthly	-Tax compliance by the developer -Compliance to scheduling and sequencing of project development		

9.0 COST BENEFIT ANALYSIS OF THE PROJECT

The cost benefit analysis of the proposed project highlights the costs the developer will incur in terms of investment and the cost of dealing with mitigation measures proposed to offset negative impacts emanating from various activities of the project as well as benefits that will be generated by the project. Similarly, the assessment has identified a number of benefits and costs that will be borne by local communities, the district and Tanzania as a nation at large. These were identified by stakeholders, analysed by the EIA team and followed up in later consultations.

9.1 THE PROJECT COSTS

A cost/benefit analysis (CBA) is a systematic evaluation of the economic advantages (benefits) and disadvantages (costs) of a set of investment alternatives. The analysis evaluates incremental differences between the base case and the alternative(s). In other words, a benefit-cost analysis tries to answer the question: What additional benefits will result if this alternative is undertaken, and what additional costs are needed to bring it about? The CBA have covered the financial analysis, economic analysis of the original project proposal and an extended cost-benefit analysis for the project. However, for a project to be judged viable or not, a comprehensive feasibility study that includes the costs related to mitigation/enhancement of environmental impacts of the project have to be included. The initial investment costs of the proposed project are presented in Table below.

For this particular project, the total investment cost is 30 billion Tsh which will cover the cost as stipulated in Table 18 below. In addition to cost directly related to the project there will be other cost for addressing environmental issues including cost of implementing mitigation measures to offset foreseen impacts as well as cost of implementing the project management plan as stipulated in chapter eight of this report.

Table 18: Investment Cost of the Project

ESTIMATED COST OF THE PROJECT		
S.NO.	**PARTICULARS**	**ESTIMATED COST IN EURO**
1.0	**Acquisition costs**	
2.0	**Construction cost (machinery, labour, transport and taxes)**	
	Other construction	
Sub. Total		
3.0	**Marketing & Leasing**	
4.0	**Professional Fees**	
	Consultancy	
	Overheads	
	Legal Fees	
	ESIA	
	Geo Technical Investigations	
Sub. Total		
5.0	**Total Interest and Fees Included in Project Cost**	
6.0	**Total Interest Included in Project Cost**	
7.0	**Total Fees paid for All Sources**	
8.0	**Provision for Contingencies**	
TOTAL		

9.1.1 NON-QUANTIFIABLE BENEFITS AND COSTS

The proposed project is expected to bring benefits to local communities, Municipality and to Government at large. This would be represented by the value of the compensation they will receive, employment level as result of the project and growth of income from the project and auxiliary activities.

Local communities expect to benefit in terms of employment opportunities directly from the enterprise or from jobs created in the local economy as a result of other auxiliary economic activities. This EIA is proposing enhancement measures to ensure that this actually happens. The project will

also benefit the community by resolving the long-lasting problems caused by shortage of clean and safe water for domestic use as well as inadequate sanitation facilities in the Municipality. the community will benefit in terms of the improvements to health of men, women and children as a result of improved water supply and sanitation, reduction in time spent collecting water, thus utilisation of saved time in other family activities and therefore improvement of quality of life, significant improvements in household income levels and thus improvement of economic status of the households, improvement of security of livelihoods due to limited travel times especially in the evenings in search of water, as well as increased school attendance resulting from better child care arising from improved water supply and sanitation.

Local communities expect the project will stimulate growth of municipal economy and increase revenue, hence contribute to municipality's efforts to reduce poverty. The areas that are likely to grow because of project include increase commercial activities, employment and increase market for farm products inside and outside the area. The project will create a market for food products, livestock products and auxiliary services. The money spent locally will again generate multiplier effects to the local economy.

The Central Government (MoWI/MORUWASA) is also expecting to derive benefits from the proposed development in terms of revenue generation, employment creation and development of associated infrastructures. The project will diversify the economy of the area and the government will gain through corporate tax payable from time to time. This is in addition to other taxes such as Pay As You Earn (PAYE), which is paid monthly on the basis of the payroll and the Value Added Tax from various established enterprises.

The local government will benefit from local taxes payable and dividends paid from various investments. The presence of the project is expected to boost the tax collection in the area. The Municipal treasury expects to increase its revenue from own sources through increased property tax and taxes from small businesses in Morogoro municipality. In general, the proposed development will stimulate improvement of infrastructure and improved livelihoods for the people.

Thus, although these benefits cannot be quantified due to unavailability of data, if they are added on to the quantifiable ones, the value of benefits will increase greatly. This EIA is proposing mitigation and enhancement

measures to reinforce those activities that will increase the benefits to local people, local government and central government.

9.1.2 COSTS TO LOCAL COMMUNITIES AND GOVERNMENT

Despite the benefits, there are also possible costs to local communities and central government, which include the following:

- Increased prices for commodities and cost of living,
- Increase in levels of accidents (from construction activities and road traffic).
- Possible increases levels of crime due to the increase of population in the area.
- Cost of maintaining law and order in an area that is growing fast due to construction activities.
- The government will bear some costs such as provision of infrastructure for the project –road maintenance, increased cost of law and order and overall administration costs.

These costs are expected whenever a new investment is planned in an area that previously did not have such an investment. Thus, in a way they are unavoidable. What is important is to propose a series of mitigation measures as proposed in chapter 7 and 8 covering the cost to communities so as to minimize the negative effects and impacts of the project on these aspects. Communities may also incur costs due to excessive use of local materials by the project, environmental pollution, increased pressure on local resources and illness and diseases (respiratory and poisoning) associated with the project development in the area

10.0 DECOMMISSIONING OF THE PROJECT

Decommissioning is a stage the project or activity of the project is formally ending. Tanzania has experienced challenges in dealing with the decommissioning of most of the development projects including construction projects, since many of these were decommissioned without addressing the social and environmental implications arising from the decommissioning process. The Regulations for Environmental Impact Assessment (URT, 2005) directs developers to address the implication of decommissioning process as part of the EIA process.

The proposed project constitutes activities such as levelling of the site, construction of basement structure of Mindu dam, construction of the plant and storage tanks and other related infrastructures. So far, no specific time for the decommissioning of the project has been set but this will depend on the operation lifespan of the water supply and sanitation project.

Several impacts (negative and positive) are likely to occur as result of the decommissioning. This chapter outlines the implications of decommissioning of the proposed development and suggest mitigation measures to deal with impacts. However, as a precondition to effective and comprehensive implementation of the mitigation measures for decommissioning, the developer must prepare and implement a Closure and Restoration Plan and set aside sufficient funds for post operation reclamation activities. The project Closure and Restoration Plan should include the reclamation of the area and address the mitigation measures to minimize the projected impacts.

Impacts associated with decommissioning have been described and assessed in chapter 7 and monitoring plans that covers aspects of mitigation measures associated with decommissioning have been highlighted in chapter 8 of this report. For example, the challenge to deal with lay off labour force and the loss of income that was coming from the facility to the national economy has been highlighted and measures to mitigate that impact have been developed. Some of the proposed measures require Government intervention in terms of ensuring greater opportunities of investments in other area for the workers as well as acquiring skills and knowledge that could be used either in similar areas or alternative employments. Similarly, the estimated costs for decommissioning specific activity are provided; these however are indicative costs that are likely to change given the technology, time of implementation and the level of integrity of the environment required.

11.0 CONCLUSION AND RECOMMENDATION

Most of the significant observation associated with this EIA is that the proposed development of water supply and sanitation will have significant contributions to the socio-economic growth of Morogoro Municipality. Several other benefits at both local and national level in terms of revenue generation and the multiplier effects associated with linkages with local and national economy have been highlighted in this document. Importantly, the project complies well with key national policies and legislations including the National Environmental Policy, the Environmental Management Act, the Land policy, and the Land Act, among other aforementioned legislations.

Apart from the project positive impacts there are some negative primary and secondary impacts on the natural environment, pollution and waste management. These impacts have been carefully assessed and evaluated and mitigation measures proposed in a comprehensive Environmental and Social Monitoring Plan.

The study concludes that apart from the highly significant benefits to the national and local economy, most of the observed negative impacts can be mitigated or minimized. Therefore, the development project is ecologically manageable, socially desirable and economically viable with more benefits compared to project costs.

The Project will improve the health and sanitation conditions of the urban communities and strengthen the environmental planning, management and monitoring functions. The improvement of water supply and sewerage services under this project will enhance the overall urban environmental quality and public health of Morogoro Municipal Council and its surroundings. Environmental benefits include improved ground and surface water quality as well as improved sewage collection and treatment. This will significantly improve health and quality of life of the urban population.

Since Industrial stabilization ponds at Kihonda, Mambogo Water Treatment Plant and Vituli Water Intake Point and its surrounding catchment areas are operational but no expansion works are envisaged under the project, the following protection works are recommended:

- Industrial waste stabilization ponds at Kihonda should be looked at as far as environmental safety is concerned. Rehabilitation should be carried out in order that they function effectively and discharge effluents that meet environmental standards. Meanwhile, an Environmental Audit for the four industries located at Kihonda should be undertaken by the relevant enforcing authority to determine

socio-economic and environmental condition of the industries and whether pre-treatment systems located inside the industries are working as intended. It is anticipated that the effluent from the Waste Stabilization Ponds will attain the Tanzania Requirement of 20mg/L BOD.

- Mambogo Water system is working efficiently and no expansion works are envisaged but currently, the area around the intake is encroached by human activities and settlements. It is therefore proposed that measures are undertaken like regulating agricultural activities and fencing the intake to protect it from contamination.

- Vituli water treatment is also encroached by residents and human activities risk polluting the existing intake. No expansion works are proposed at here but the intake needs protection to make it safe and sustainable in the long run.

Moreover, the proposed development largely conforms and is in support of various national policies and is likely to make significant contributions to the national and local economies. The EIA further recommend that ***the proposed project should be considered for development as it meets the relevant policy objectives and most of the environmental and social impacts can be managed.*** However, the proposed mitigation and enhancement measures recommended in this EIA should be implemented in order to ensure that project benefits are realized or optimized. The most important recommendations include the following:

(i) Developer should adhere to policies, legislation and international convention, national and international standards and regulations of health requirements and develop and implement in-house manual/guidelines on health and safety.

(ii) Developer should prepare separately, a capacity building programme for MORUWASA and LGA staffs on the implementation of the ESMP.

(iii) Developer should ensure that awareness campaign on the importance WSS, health and hygiene measures is undertaken together with the implementation of the project

(iv) NEMC should ensure all mitigation measures are implemented as per the proposed ESMP.

(v) Developer should raise awareness on STDs and other infectious diseases to workers in all phases including providing safety gears (PPEs), improving health services and promoting voluntary counselling and testing services for HIV/AIDS.

(vi) The contractor should institute traffic management and safety program including providing proper signage and training of heavy vehicles operators and drivers, enforcement of speed limits, maximum loading restriction and compliance with national transportation laws and standards.

(vii) The project activities should be confined to core area during construction phase.

(viii) Developer should prepare an empowerment programme for communities outside the project areas to explore ways in which they can effectively benefit from the project development. The programme can be implemented jointly with LGA.

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ANNEX 1: LIST OF STAKEHOLDERS CONSULTED AND THEIR CONCERNS

Date	Organisation	Contact person	Key issues raised/discussed
21/03/17	Morogoro Municipal Council	Department of economics, planning and statistics Sadoth F. Kaijage 0754653745	• The project is beneficial to the Municipality due to the fact that the current water supply and sanitation is a problem in the Municipality • MORUWASA capacity to provide service to the community is not as fast as the growing Municipality population. • Water supplied from Mindu dam and treated at Mafiga treatment plant has bad smell and high turbidity compared to water supplied from Mwambogo intake/treatment plant. • Hence MORUWASA should expand the capacity to treat the water at Mafiga treatment plant • The challenge MORUWASA is facing is that all the three major water sources at Mindu dam, Mambogo and Vituli have been encroached by the people i.e. settlements and agricultural activities • People are willing to pay if the service is improved and is reliable • There is rapid occurrence of diseases such as typhoid, cholera etc. due to poor quality of water supplied in the Municipality, poor sanitation and hygiene
	Morogoro Municipal Council	Department of Environment and health Martin Mzyanda 0715056991	• Dumpsite is there and it is located 7km from municipality town • There is about 3 waste trucks, 5 skip masters, and 1 compactor for collecting and treating the municipal waste. Only 2 skip masters and 2 trucks are working at the moment • Generally, the condition for cleanness and waste collection is in the medium standards and more works is required • People contribute in the waste collection from the households • Wastewater and sewerage system should be constructed in the required standards to avoid blockage which may be hazardous to the environment • There is a lot of blockage to the existing sewerage system which pollute the environment • The municipality suggested the introduction of By-laws to impose fine for the blockage pipes which last longer than 6hrs without any action undertaken

			• MORUWASA are not active to rectify the blockage pipes on time • ponds for industries are located at Kihonda but there is no any institution that is taking care of those ponds. From those ponds the untreated effluents are passing through the residential area and released into Ngerengere river. • We recommend for Immediate actions should be undertaken for the Kihonda Industrial Ponds
	Mindu Dam –Mafiga water Treatment Plant	Maliki Ally -Lab technician 0659767591 Zuberi Mnyamuru –operator 0715251676	• The water condition at the Mindu dam is not good, there is contamination and water is greenish • There is encroachment at the Mindu dam. Few settlements and agricultural activities are carried out within the 500m surrounding the dam • It was reported that Mzinga Army Barracks are releasing the effluents in the dam. Follow up should be made on this including taking the water samples for quality testing of Mzinga effluents and at Mindu dam to establish a case against Mzinga. We recommend during full EIA. • Filtration at the Mafiga water treatment plant is not effective and some of the chemicals used in filtrations such as Algae Floc are not available that's why the already treated water is not clean (it has high turbidity) • In the Mafiga treatment plant there is noise from the pumps which required the workers to frequently wear protective gears • Visiting at Tumbaku distribution centre it was found that the pump where switched off due to the fact that the water was not enough for distribution. Tumbaku plant is receiving about 1160 m^3 per hour from Mafiga Plant • Capacity for Mafiga water treatment plant should be increased as the current plant is not supplying the required demand (more than 80% of the population is depending on the water from that plant)
22/03/17	MORUWASA	Eng. Nicholaus Angumbwike –MD	• MORUWASA are the owner of the project and the authority has been ready to give cooperation to the consultant teams • Concern on the quality of water from Mindu dam it is recommended that the water should be tested in the laboratory to understand its current quality and establish evidence if the water is contaminated from Mzinga

	VITULI Intake point Bigwa Ward	Frank Suni –pump operator 0762923366	• In this intake, there are two projects; Gender Equitable for Local Development (GELD) implemented by MORUWASA and WSDP project funded by World Bank and implemented by Municipal Council. • About 9 intakes have been connected in one intake point/tank • The main challenge with Vituli intake is that the intake catchment area is surrounded by human settlements and agricultural activities, and there is no fence to demarcate the area • Houses and sanitary facilities have been constructed close to the river banks • Agricultural activities are conducted in the slope of the mountain which pollute the water source • The water contaminated with eroded soil from the top of the mountain • People living near the water source have their own water connection into their households. To be connected with the service each household pays Tsh. 50,000/= and when there is blockage or breakdown they contribute 1,000/= for maintenance • The place has no electricity and there is no reliable road for all weather
	Kingolwira proposed area for contracting the Tank		• The place earmarked for constructing the tank seems like it's a private owned land • If the proposal will be initiated the government should negotiate with the owner and all other procedures such as full and prompt compensation should be provided
	Mindu Dam	Soud Matokeo –pump operator 0754310416	• Currently the dam is about 507m above the sea level • Condition of the dam is not good and there is encroachment in the sources of water in the Mindu dam. • Few settlements and agricultural activities are carried out within the 500m surrounding the dam • The main source of pollution is coming from agricultural activities carried out near the dam • Conservation of Mindu catchment area and all the main sources of the five rivers should be undertaken as soon as possible • People who have encroached within the area should be removed as soon as possible

	Mambogo intake point	Jeremiah Ntarugela –SPO 0713418057	• This source supply about 13% of consumed water in Morogoro Municipality • Water from Mambogo is distributed to Forest hill, Kilakala, Boma road and CDB town where the replacement of the old pipes will be conducted • The river is also encroachment by human settlements and various activities are conducted along the valley • People are washing clothes and bathing in the river • Immediate action is required to stop the encroachment of the river catchment
	Rock garden, Boma road, Kilakala and CBD		• Most of the old pipes are passing through road reserves and residential areas • To replace these old pipes with new one as well as extension of water supply in these areas might affect some of the existing infrastructures in these areas
23/03/17	Morogoro Municipal Council	Eng. Thomas Ngaziga – Head Environmental and Health Unit	• The stabilization ponds for the industrial effluents at Kihonda are not working properly and need to be maintained • It was not clear who own and operate the ponds between MORUWASA, Municipal Council and Industries • The condition of the ponds is terrible and all the effluents are not properly treated before discharging in Ngerengere river • Effluents from the industries have never been treated since the privatization of the industries • People are cultivating alongside the ponds which is more dangerous to their health and wellbeing • By observation the water is green and smelling and the vegetation surrounding the dams have dried • The effluents contain chemicals which are dangerous to the environment and the existing living organisms • The effluents have no proper channel for discharging in the river and they are passing through nearby human settlements • The municipal council agreed to rehabilitate the dams however there is no enough budget for this activity. Only Tshs. 30,000,000/- (30 Million) were allocated out of 2billion requested • Environmental Audit for the four industries located at Kihonda should

			be undertaken to determine socio-economic and environmental condition of the industries and whether pre-treatment system located inside the industries are functioning well • Some areas such as Kihonda, Kiwanja cha ndege, Taifa, Mafisa etc. are not connected with sewerage system • We cannot talk about constructing new ponds while the existing one are not well maintained and almost 95% of the population are not connected with the system • Marketing sewerage system should be conducted and people are ready to pay by instalment if the system will work efficiently. MORUWASA are not taking sewerage as a business opportunity
23/03/17	Department of land and town planning	Simon Mahundo –Town Planner 0714772375	• Most of the area within the municipality is not supplied with water service • The existing plan for Morogoro municipality is old and they are in the process of preparing a new master plan • The master plan will be a comprehensive document for planning and development of the Municipality • The plan will be ready on April 2017
23/03/17	Wami/Ruvu basin	Rosemary Masikini – Hydrologist 0655774738	• The basin is slow to make follow up on the conservation of water sources • However, the main role of the basin is to conserve the water sources/catchment areas • Also, the basin is required to establish Water Users Associations and provide water permits • To check for the quality and quantity of the water from the various water sources • Most of the water sources are encroached by the people who connect to themselves and to other people after payment • Mindu dam is a protected area and no activity should be conducted within 500m • However, agriculture activities are conducted inside the 500m and some settlements have been established inside the catchment area • Most of the rivers around Mindu catchment have been encroached despite the fact that no activity supposed to be undertaken within the minimum of 60m from the river • Basin officers are participating in the regional and district committees

			which are conducted twice a year • Mzinga are discharging the wastewater in Mindu but after they have been treated from their ponds • Mzinga they have canals to treat wastewater and last filtration is released in Mindu dam • Influent Water into the dam should be tested for heavy metal. Siamic library in DSM has capacity to measure heavy metals • Before concentrating on raising the dam the existing problems should be solved • All the source of water to Mindu dam should be conserved • Catchment management should be a key focus to reduce sediments from the dam and contamination • The existing catchment plans should be implemented • The recommendation from the rapid assessment report of the Mindu dam should be taken into consideration • There is a report for water quality conducted by the municipality and can be assessed from the Municipality
24/03/2017	Industrial stabilization ponds at Kihonda and Mindu catchment areas	Daud Salum –Diwani Mafisa 0716872263 Paul Ngonda –Ag WEO Mindu 0714098172	• The proposed area for stabilization ponds at Kihonda is full of human settlements and all key services such as water, road and electricity are available. To continue with the proposed plan will require to conduct resettlement action plan to reallocate the people and compensate them to another area which is adding more cost to the project. The best option is to earmark a new area/plots for constructing the proposed wastewater stabilization ponds • The houses are constructed near the Ngerengere river banks which is hazardous to the environment and the sustainability of the river itself • No maintenance is done at the industrial wastewater ponds and the untreated effluents are discharged into River Ngerengere through the residential areas This is dangerous to the health of the people and living organisms in the river and the surroundings • Currently, the wastewater stabilization ponds at Mafisa are operating, however there is a challenge of influents from the households/customers being mixed with solid waste • Treated effluent from these ponds is discharged in the Morogoro river • Five rivers are the main source of Mindu dam, these are Mlali River, Mgera River, Lukulunge River, Mzinga River and Ngerengere River. Mgera river is encroached and it is dry

			• Mlali River is encroached and disappeared in the rice plantations. Wami/Ruvu basin authority have established a programme to reopen the river channel which disappeared in the farms • Mzinga ponds are constructed close to the dam and their effluents are released into the dam

***NB:** Some consultations are documented in section 6.3.2 of this report

ANNEX 2: PHOTOS

Photo No. 1: Mindu Dam

Photo No. 2: Mindu residents access the dam for the domestic water and this leads to water contamination

Photo No. 3: Agricultural activities are going on inside the project area (i.e. at the Mindu dam catchment area and along pipeline from Mindu Dam to Mafiga Water Treatment Plant)

Photo No. 4: Wastewater disposal at Mafisa Waste Stabilization Ponds from unconnected individuals

Photo No.5: Screening the influent of solid wastes from entering the waste stabilization ponds

Photo No.6: Smell, coloured and untreated industrial effluents from the abandoned Waste Stabilization Pond at Kihonda crossing the residential area into Ngerengere River

Photo No.7: Industrial effluents from the abandoned Waste Stabilization Pond at Kihonda area enter into Ngerengere River and contaminate the river water

Photo No. 8: Kipera Proposed site for Waste Stabilization Ponds along Ngerengere river

Photo No. 9: Farming activities going on in the catchment area of Mindu dam

Photo No. 10: Cultivated maize in the catchment area of Mindu dam

Photo No. 11: The Morogoro – Iringa tarmac road and some residential buildings that are within the catchment area, need to be demolished

ANNEX 3: RESPONSE TO COMMENTS ON DRAFT EIA

RESPONSE TO CLIENT'S COMMENTS ON DRAFT EIA

NO	OBSERVATION	COMMENTS	RECOMMENDATIONS	ACTION BY SEURECA/NETWAS AND REFERENCE
1	Item 1.0, pg no. 2, The Mambogo and Vituli intakes are encroached by human activities and settlements	Kigurunyembe and Kibwe water sources are also encroached by human activities and settlement but are not mentioned in the report	Kigurunyembe and Kibwe intakes should be incorporated	encroachment by human activities on Kigurunyembe and Kibwe intakes has now been incorporated in the report - page 3/131
2	Under enhancement measure, pg number 4 ''Enforce legislation to discourage people from stealing manhole covers''	Not only manhole covers, laws should be enforced to prevent the vandalism of water supply networks and Sewerage system infrastructures.	Should be incorporated	Proposal for prevention of vandalism of water supply networks and Sewerage system as a whole has been incorporated in page 5/131
3	Page no 5. negative impacts and mitigation measures part (a)	The Loss of land and properties may be due to construction of WSP, expansion of water treatment plant and construction of storage tanks	Should be included in the report	Comment has been addressed in page 5/131
4	Page no 5. negative impacts and mitigation measures part (d) Risk of ground and surface water pollution due to seepage and overflow of raw sewage from WSP	The risk of ground and surface water pollution may be caused by the seepage in WSP and overflow of raw sewage from Manholes due to blockages of sewerage system	Should be stated	Comment has been addressed in page 5/131
5	Page no 5. negative impacts and mitigation measures part (k) Creation of damage on WSP by toxic industrial effluents	It should be stated on how WSP is going to be damaged by toxic industrial effluents. There is no industries or proposed industrial site near Kihonda/Kipera prospective WSP	Should be clarified	Clarification has been provided in section j, page 5/131
7	Under mitigation measure pg 5 (c)	Compensation to the affected people should be done together with reallocation of some affected infrastructures	Should be incorporated	Comment has been addressed in section c, page 6/131
8	Under mitigation measure pg 5 (f)	Repetition: Has been reported under (e). The sentence under part (e) should be restructured	Please incorporate	Comment has been addressed in page 6/131
9	Under mitigation measure pg 5	Item (d) and (h) should be combined	Should be incorporated	Comment has been addressed in page 6/131
		Item (k): not only to Ensure proper operation and	Should be incorporated	Comment has been addressed in page 6/131

NO	OBSERVATION	COMMENTS	RECOMMENDATIONS	ACTION BY SEURECA/NETWAS AND REFERENCE
		maintenance of WSP but also sewerage network.		
10	Table 4, pg number. 50 no sewerage connection at Uwanja wa Taifa and Khonda Maghorofani	Uwanja wa Taifa and Kihonda Maghorofani wards are connected with sewerage services	Please revise the table.	Comment has been addressed in page 51/131
11	Table 4, pg no. 50 the number houses connected to sewerage system at Luhongo (**Luhungo**) is 504	There is no sewerage connection at **Luhungo** (there is no such a place called Luhongo)	Please revise the table.	Comment has been addressed in page 51/131
12	Pg no 51, para 3…''On the other side, the Authority had a total of 1,1746 sewerage connections compared to 1,495 of the previous year (an increase of 16.7%)''.	The figure of 11746 sewerage connection has never being reached by MORUWASA. The Para should be restructured (it lacks continuity)	The para should be revised.	The section has been revised page 51/131
13	Pg no 51, paragraph no. 4…	The number private empting trucks should be reported. Industrial waste water is never being discharged to Mafisa treatment plant	Please revise	There was no word 'industrial' wastewater
		…''the availability of private emptying trucks has been found to contribute in minimizing direct discharge of waste water into Morogoro River and Kikundi stream''	The information presented here, should be justified by data	It has been removed from the report
14	Page number 69, the last bullet	Mambogo treatment plant is newly rehabilitated plant. Full EIA was carried out under MCA-T project.	Environmental Auditing is not required here.	Comment has been addressed in page 69 and 70/131
15	Pg 70, the second bullet…. ''the connection fee is 500,000/- Tshs per individual''	the connection fee is charged in terms of 20% of the total cost of materials required for the connection	Should be revised	Relevant section revised in page 70/131
16	Page 71, Under Mafiga ward, bullet number 4 and Page 74, under the subtitle Kihonda ward, the second bullet	The word Kadongoro should be written Kidondolo and Kiegea A instead of of Kigea A.	Should be revised	Relevant corrections made on page 71 and 74/131