SOUTHERN REGION WATER BOARD

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE UPGRADING AND EXTENSION OF LIWONDE AND BALAKA WATER SUPPLY PROJECT

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List of acronyms and Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
BBTV	Banana Bunchy Top Virus
CMCs	Catchment Management Committees
COMSIP	Community Service Investment Programme
DEC	District Executive Committee
DHIS	District Health Information System
DI	Ductile Iron
DLO	District Lands Officer
DPD	Director of Planning and Development
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EMA	Environment Management Act
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GI	Galvanised Iron
GoM	Government of Malawi
GRM	Grievance Redress Mechanism
HIV	Human Immunodeficiency Virus
IAS	Invasive Alien Species
Km	Kilometres
l/s	Litres per second
m^3/d	Cubic metres per day
MBS	Malawi Bureau of Standards
MGDS	Malawi Growth and Development Strategy
MDHS	Malawi Demographic Health Survey
MEPA	Malawi Environment Protection Authority
MIEO	Monitoring, Information and Evaluation Officer
MPC	Malawi Postal Corporation
mPVC	Modified Polyvinyl chloride
MTL	Malawi Telecommunications Limited
NAPA	National Adaptation Programme of Action
NEAP	National Environmental Action Plan
NSOER	National State of the Environment and Outlook Report
NSP	National Sanitation Policy
OFID	OPEC Fund for International Development
OPEC	Organisation of the Petroleum Exporting Countries
OS	Operational Safeguard
OSH	Occupational Safety and Health
OSHW	Occupational Safety, Health and Welfare
PPEs	Personal Protective Equipment
SEP	Socio-economic Profile
SRWB	Southern Region Water Board
STIs	Sexually Transmitted Infections
TNM	Telecommunication Network of Malawi
uPVC	un-plasticised polyvinyl chloride
USD	United States Dollars
UTM	Universal Transverse Mercator
VNRMCs	Village Natural Resource Management Committee
VSCS	Village Sanitation Committee
VSL	Village Savings and Loan
WASH	Water, Sanitation and Hygiene
WTP	Water Treatment Plant
WUA	Water Users Association
WWEC	Water Waste and Environment Consultant

Executive Summary

1. Introduction and Background

This is an Environmental and Social Impact Assessment Report for the upgrading and extension of the Liwonde Water System to cover supply to Balaka and Liwonde Townships. Under the proposed project it is planned that there will be construction of a new intake at the Shire River; construction of a new water treatment plant; installation of pumping facilities for delivery of the treated water; construction of water storage tanks as well as distribution networks and provision of materials to house connections and communal water points. It is expected that the project will be implemented for a period of 18 months starting from June 2022.

The proponent of the proposed project is Southern Region Water Board (SRWB) created in 1996 under the Laws of Malawi Chapter 72:01 to be responsible for the supply of potable water and the disposal of waterborne sanitation in all the urban centers of the Southern Region of Malawi with the exception of City of Blantyre which is under the jurisdiction of Blantyre Water Board. SRWB operates 25 water supply schemes under five management zones for water supply to urban centres. Liwonde Water Supply System is within the mandate of the Southern Region Water Board.

The cost of the project is estimated at €23,700,000.00 or MWK 21,946,911,000.00, converted using a rate of €1= MWK 926.03, quoted on the Reserve Bank of Malawi website on 20th January, 2022. This cost estimate is still subject to change upon final review of project designs. It is estimated that the project will employ about 10 people during the Planning and Design Phase; while a minimum of 150 skilled and unskilled workers, among which 40 percent will be women are expected to be employed during the Construction Phase. During Operation and Maintenance Phase SRWB will use existing staff and employ additional 15 staff members.

2. Rationale/ justification of the project

The Liwonde Town water supply system was designed to meet the water demand needs for the 2010 population of the town. The current Liwonde Water Supply System has therefore outlived its design life leading to people in the town facing water shortages.

Balaka Water Supply System, which is also under the Liwonde Water Supply System , supplies water to communities in Balaka Town. The Balaka system draws most of its water (over 85%) from the Mpira Dam in Ntcheu District where SRWB buys the water from the Mpira-Balaka Water Trust, a Malawi Government Agency which runs the Mpira-Balaka Rural water supply system. The remaining proportion of water for the Balaka system is supplied through motorized boreholes. The total population in the two towns of Balaka and Liwonde is fast growing and is currently estimated to be at around 70,000 and is projected to grow to about 100,000 in the next 10 years. Currently the SRWB is able to supply only about 45% of the total population in both towns with safe drinking water.

The Balaka water supply system is also presently challenged with inadequate water supply source from the Mpira Dam. The Dam is facing a problem of drying up due to climatic change factors, catchment degradation as well as a significant increase in the rural and urban populations it serves. There is therefore a need to identify another more reliable source to supply water to the people of Balaka Town.

Taking into consideration these challenges of high population growths in the towns of Balaka and Liwonde as well as the inadequacies in the water supplied by the two systems, the SRWB plans to implement the upgrading and extension of the Liwonde System to cover supply to Balaka Town. The planned project will see the construction of a new intake at the Shire River, a new water treatment plant, pumping facilities for delivery of the treated water to Liwonde as well as Balaka towns, construction of water storage tanks as well as distribution networks in both towns and provision of materials to house connections and communal water points.

3. Rationale for Conducting ESIA

The ESIA study was conducted in accordance with the requirements of the Environment Management Act (2017), which requires that an Environmental and Social Impact Assessment should be conducted before implementation of certain prescribed projects. In addition, *'Guidelines for Environmental Impact Assessment'* for Malawi prepared in 1997 stipulates that all Water supply projects involving water withdraws from rivers, lakes and reservoirs and construction of major water pipelines as is the case with this water supply project requires an ESIA. ESIA is a tool that enables identification and assessment of a project's environmental and social impacts and proposes measures to manage the impacts before the project is implemented. An Environmental and Social Management Plan (ESMP) has further been developed for the project to be used as a tool to systematically integrate environmental and social concerns into the activities of the project.

4. ESIA Objectives

The main objective of this Environmental and Social Impact Assessment is to identify, predict and evaluate environmental and social impact of the proposed Liwonde-Balaka Water Supply Project, provide information on the environmental consequences for decision making and promote environmentally sound and sustainable development through the identification of appropriate alternatives and mitigation measures.

5. Methodology for carrying out an ESIA

The ESIA study was carried out in accordance with the Terms of Reference provided in Annex 1 of the report. The strategies for executing this assignment followed the steps outlined below:

i. Examination of existing conditions of the project site;
ii. Examination of implementation approach and processes for the activities of the project;
iii. Identification and analysis of potential environmental and social impacts associated with the implementation of project activities which are likely going to be triggered and generated within and around project impact area; and
iv. Identification of appropriate mitigation measures for the predicted impacts and preparation of a management plan for addressing the environmental and social impacts during implementation and operation.

In order to achieve the objectives outlined above, Literature Review, field Visits, stakeholder consultations were undertaken.

6. Summary of Positive and Negative Impacts

The implementation of the project is expected to generate both Positive and Negative Impacts during the Planning, Constriction and Operation Phases. Below is a summary of main impacts and their management measures.

6.1 Positive Impacts

6.1.1 Planning Phase

1. **Creation of Employment:**

Enhancement Measure

- Give priority to Local Consulting Firms; and
- In an even that the local consulting firms do not qualify, ensure that international firms have more than 50% of their professionals as Malawians.

6.1.2 Construction Phase

1. **Creation of Employment:**

Enhancement Measure

- Employ 80 percent of the labour force from surrounding communities;
- Prepare and implement Labour Management Plan.

2. **Skills transfer to locals through employment**

Enhancement measures:

- Engage over 80 percent of the labour force from surrounding communities; and
- Ensure that women are given employment opportunities when engaging labourers in construction works.
- Prepare and implement Labour Management Plan.

6.1.3 Operation Phase

1. **Improved water supply to Liwonde and Balaka Townships**

Enhancement measures:

- Ensure water reservoir tanks have adequate water all the time to cover periods of no water pumping;
- Sustain the desired performance of the water supply system through timely preventative maintenance;
- Quickly carry maintenance works and restore water supply when there are problems;
- Prepare and implement an intake management plan, including protection of lake Malawi, to prevent pollution;
- Regularly conduct water quality tests at the water treatment plant, in the distribution lines and in the supply points; and implement control measures where results are below safe water standards;
- Employ adequate staff and ensure that they provide appropriate work inputs through proper work schedules; and
- Sensitize the water users on proper water management practices and payment of water bills in time.

2. **Improved sanitation, hygiene and health**

Enhancement measures

- Sustain the desired performance of Balaka and Liwonde Water Supply schemes;

- Conduct water quality tests at the water treatment plant, in the distribution lines and in the supply points;
- Sensitise communities on hygienic practices for handling water to avoid secondary contamination;
- Promote general sanitation practices amongst communities in the project area; and
- Implement the project within the planned duration.

6.2 Negative Impacts

6.2.1 Planning Phase

A. **Loss of land property**

Mitigation measures

- Prepare a Resettlement Action Plan (RAP) for the project affected persons (PAPs) where avoidance is not possible;
- Develop the Grievance Redress Mechanism(GRM) for the project and should be easily be accessible by all the affected persons.
- Minimise potential land acquisition by properly designing infrastructure and adopting a good layout plan of the infrastructure;
- Locate transmission and distribution lines within existing road reserves, as much as possible; and
- Plan and prepare all compensations in coordination with the District Commissioner and the Department of Lands.

6.2.2 Construction Phase

1. **Land degradation**

Mitigation measures

- Ensure that vegetation is cleared and excavations are done as designed to avoid unwarranted clearance of vegetation;
- Avoid deposits and piling up of loose soils on slopping ground or near drainage channels;
- Rehabilitate affected land by tilling the soils to facilitate natural regeneration of vegetation;
- Use excavated soils to rehabilitate eroded areas.;
- The routing of pipe layouts and access roads should follow areas with as little vegetation as possible;
- Minimize the number and length of access roads and use existing roads or tracks as far as possible;
- Provide all structures required for effective water drainage; and
- If crossing of watercourses cannot be avoided, erect a bridge or a culvert.

2. **Risk of accidents and occupational safety hazards**

Mitigation measures

- Rehabilitate all borrow pits to be created during the upgrading, rehabilitation and expansion of the water supply systems;
- Barricade all trenches and open pits and place clear signs to protect animals and people from falling into them;

- Inform and sensitise the public about all open pits and trenches; and
- Enforce speed limits for moving construction vehicles to minimise the risk of fatal accidents.

3. **Creation of borrow pits**

Mitigation measures

- Source quarry stone, sand and gravel from licenced suppliers or sources;
- Rehabilitate all borrow pits to be created during the upgrading, rehabilitation and expansion of the water supply systems;
- Barricade all trenches and open pits and place clear signs to protect animals and people from falling into them;
- Inform and sensitise the public about all open pits and trenches; and
- Supervise adequately the installation of storage tanks and pipelines and follow recommended procedures.

4. **Disruption of water supply**

Mitigation measures

- Give adequate notice of potential water disruption to the water users that could be affected; and
- Provide alternative means of supplying water such as temporary by-pass piping or water bowsers where appropriate.

5. **Risk of increase in spread of HIV and AIDS**

Mitigation measures:

- Sensitise workers and surrounding communities on the dangers of indulging in unprotected sex; and
- Provide both male and female condoms to workers for appropriate use.

6.2.3 Operation Phase

1. Increase in solid waste generation

Mitigation measures

- Metal waste should be recycled and/ or sold to tinsmiths or vendors for reuse or re-sale;
- Provide solid waste storage bins and skips;
- Monitor skips so that they do not become overfilled;
- Ensure that collected solid waste is disposed of in an approved disposal sites; and
- Implement sensitization campaigns on consequences of indiscriminate waste disposal.

2. Increased pollution from wastewater and sludge

Mitigation measures

- Enforce proper excreta and wastewater management especially in the town;
- Apply lime treatment to dewatered sludge to suppress pathogens and remove odour;
- Use licensed liquid waste handlers;
- Dry sludge on drying beds before disposing off in a dedicated disposal site;

- Prepare and enforce operational guidelines for sludge treatment and management; and
- Conduct WASH activities to sensitize people on the benefits (including prevention of cholera) of good the hygiene.

7. Conclusion and Recommendations

7.1 Conclusion

This Environmental and Social Impact Assessment report has identified significant environmental and social impacts of the proposed Project. The Project is beneficial as it will help the Southern Region Water Board to address some of the challenges, which it has been facing in its operations because of inadequate water supply and old infrastructure, resulting in failure to meet the increased water demand for social and economic development.

However the project is likely going to generate some negative impacts on the biophysical and socio-economic environment. The negative impacts, on overall, are assessed to be medium; mitigation measures have been proposed and are summarised in the Environmental and Social Management Plan (ESMP) for the report. A monitoring plan has also been prepared and will assist Southern Region Water Board, the Contractor and other key stakeholders to effectively monitor the implementation of the Environmental and Social Management Plan and ensure that Key Performance Indicators are achieved.

7.2 Recommendations

The ESIA study has however proposed a number of recommendations as follows:

- Considering that the project will affect some people's property, it is recommended that a Resettlement Action Plan (RAP) should be prepared and those affected by the project should be compensated before the implementation of the project;
- Southern Region Water Board should set aside required financial resources for the implementation of the Environmental and Social Management and Monitoring Plans;
- Environmental District Officers for Balaka and Machinga should be shared with the approved copies of the Environmental and Social Impact Assessment Report to effectively coordinate the implementation of the Environmental and Social Management and Monitoring Plans; and
- Different stakeholders, as indicated in the Environmental and Social Management and Monitoring Plans, should be made aware of their roles and responsibilities in the implementation of these plans.

Chapter 1: Introduction

1.1 Background and Introduction

The Southern Region Water Board (SRWB) was created in 1996 under the Laws of Malawi Chapter 72:01 to be responsible for the supply of potable water and the disposal of waterborne sanitation in all the urban centers of the Southern Region of Malawi with the exception of City of Blantyre which is under the jurisdiction of Blantyre Water Board. SRWB operates 25 water supply schemes under five management zones for water supply to urban centres. Liwonde Water Supply System is within the mandate of the Southern Region Water Board.

The Liwonde Town water supply system was designed to meet the water demand needs for the 2010 population of the town. The current Liwonde Water Supply System has therefore outlived its design life leading to people in the town facing water shortages.

Balaka Water Supply System is also under the Liwonde Management Zone and supplies water to communities in Balaka Town. The Balaka system draws most of its water (over 85%) from the Mpira Dam in Ntcheu District where SRWB buys the water from the Mpira-Balaka Water Trust, a Malawi government agency which runs the Mpira-Balaka Rural water supply system. The remaining proportion of water for the Balaka system is supplied through motorized boreholes. The total population in the two towns of Balaka and Liwonde is fast growing and is currently estimated to be at around 70,000 and is projected to grow to about 100,000 in the next 10 years. Currently the SRWB is able to supply only about 45% of the total population in both towns with safe drinking water.

The Balaka water supply system is also presently challenged with inadequate water supply source from the Mpira Dam. The Dam is facing a problem of drying up due to climatic change factors, catchment degradation as well as a significant increase in the rural and urban populations it serves. There is therefore a need to identify another more reliable source to supply water to the people of Balaka Town.

Taking into consideration these challenges of high population growths in the towns of Balaka and Liwonde as well as the inadequacies in the water supplied by the two systems, the SRWB plans to implement the upgrading and extension of the Liwonde System to cover supply to Balaka Town. The planned project will see the construction of a new intake at the Shire River, a new water treatment plant, pumping facilities for delivery of the treated water to Liwonde as well as Balaka towns, construction of water storage tanks as well as distribution networks in both towns and provision of materials to house connections and communal water points. It is expected that the project will be implemented for a period of 18 months starting from June 2022.

SRWB, through the Government of Malawi, has secured financing for the project from European Investment Bank (EIB). The cost of the project is estimated at €23,700,000.00 or MWK 21,946,911,000.00, converted using a rate of €1= MWK 926.03, quoted on the Reserve Bank of Malawi website on 20 January 2022. This cost estimate is still subject to change upon final review of project designs. The Planning and Design Phase of the project has engaged about 10 people through consultancies and SRWB is mostly using its employees to do most of the Planning work. During Construction Phase a minimum of 150 skilled and unskilled workers, among which 40 percent will be women, are expected to be employed. When the construction works are complete, it is estimated that the SRWB will need to employ an additional total of 15 workers for the operation of the new assets.

1.2 Rationale for Conducting ESIA

The Environmental and Social Impact Assessment (ESIA) study was conducted in accordance with the requirements of the Environment Management Act (2017), which requires that an Environmental and Social Impact Assessment should be conducted before implementation of certain prescribed projects. In addition, *'Guidelines for Environmental Impact Assessment'* for Malawi prepared in 1997 stipulates that all Water supply projects involving water withdraws from rivers, lakes and reservoirs and construction of major water pipelines as is the case with this water supply project requires an ESIA. ESIA is a tool that enables identification and assessment of a project's environmental and social impacts and proposes measures to manage the impacts before the project is implemented. An Environmental and Social Management Plan (ESMP) has further been developed for the project to be used as a tool to systematically integrate environmental and social concerns into the activities of the project.

1.3 Nature of the Proposed Project

The proposed project will involve the upgrading and extension of Liwonde-Balaka Water Supply System. The project seeks to construct a new intake at the Shire River, near the Liwonde Barrage close to where the old intake is located. The intake site will be located outside the Liwonde National Park. New water treatment plant will be constructed with pumping facilities for delivery of the treated water to Liwonde , Chienda usiku, Sosola, Balaka Town and Chingeni. New water storage tanks as well as distribution networks will be constructed to for efficient distribution to both towns. Communal water points are also planned to be installed and materials to necessitate more household connections will be supplied. The project is being designed to have its civil structures capable of supplying the water demands for the next 25 years for both towns of Liwonde and Balaka.

Approximately 150 people will be employed during construction phase out of which 50% will be from each district (Machinga and Balaka) and women will also be part of the team.

1.4 Justification of implementing Liwonde-Balaka Water Supply Project.

The water supply system for Liwonde currently depends on the system that was rehabilitated and upgraded in 2004. The treatment plant for the system has a capacity of 1,700 m^3/day (cubic metres per day) but currently it produces an average of about 1,300 m^3/d; its full supply coverage being restricted by a limited distribution system and pumping. The Balaka Water Supply system is based on two water sources. One source is water from the Mpira-Balaka water supply system. The other source is groundwater pumped from 6 boreholes. The yield of the 6 boreholes is a rather small as it supplies 600 m^3/day which equals to 1.7 l/s (litres per second) based on 16 hours of pumping per day. The water from the boreholes has increased mineral content of which consumers complain in cases where it is not diluted with water from the Mpira-Balaka system. Considering the fact that the water supply from the Mpira-Balaka System is quite unreliable, the only reliable source at the moment for Balaka Town is that of 600 m^3/day coming from the 6 boreholes.

SRWB is in a water purchase agreement with the government owned Mpira-Balaka water supply system for supply of 16 l/s (1,382 m^3/day). The supplied water originates from the Mpira Dam. It passes through a roughing filter and is then chlorinated. SRWB takes the water over at Sosola, a village located at the western outskirts of Balaka, 3.5 km from the centre. SRWB treats the water in Sosola, as the water quality does not reliably comply with drinking water standards. The water then flows by gravity through a closed rapid sand filter, is re-chlorinated and stored at a 1500 m^3 Sosola storage reservoir. From there the water is supplied by gravity to the distribution system of Balaka. The supplied amount is often less than the agreed amount

due to low pressure in the Mpira-Balaka system. The Mpira-Balaka system also faces frequent and sometimes long supply interruptions due to the poor condition of the system.

As a way of ensuring supply of portable water to Liwonde and Balaka towns, SRWB has embarked on the proposed water supply project that besides the board's increase in its revenue generation the citizenry in the two towns will have safe and reliable water supply.

1.5 ESIA Objectives

The main objective of this Environmental and Social Impact Assessment is to identify, predict and evaluate environmental and social impact of the proposed Liwonde-Balaka Water Supply Project, provide information on the environmental consequences for decision making and promote environmentally sound and sustainable development through the identification of appropriate alternatives and mitigation measures.

1.6 Project Location

The project is to be implemented in Liwonde and Balaka Townships as well as over the road section which connects the two towns. Liwonde Town is located in both Machinga and Balaka Districts in the Southern Region of Malawi at approximately 240 km south-east of the capital city of Lilongwe. Balaka Town is the centre of Balaka District; it is located at about 32 km to the north-west of Liwonde, on the motorway M8 and at about 210 km south-east of Lilongwe City. Figure 1.1 shows the location of the Liwonde-Balaka water project.

Figure 1.1: Liwonde –Balaka Project Area

1.7 Project Proponent

The project' proponent is Southern Region Water Board whose contact details are:

Proponent	Southern Region Water Board
Address	Southern Region Water Board Private Bag 72 Zomba Malawi
Telephone	01525311
Fax	01525054

1.8 Potential users of ESIA report

The ESIA report for Liwonde-Balaka Water Supply Project has been prepared for use by stakeholders to be involved in the planning, implementation and management of the project. Key ones include:

i. Southern Region Water Board;
ii. Contractor for construction activities;
iii. Designers and supervising engineer;
iv. District Environmental Subcommittees from Balaka and Machinga District Councils;
v. Front line Staff from other line departments such Department of Water Resources; Department Water Supply and Sanitation; Department of Occupation Safety, Health and Welfare;
vi. Malawi Environment Protection Authority (MEPA);
vii. National Water Resources Authority;
viii. Non-Governmental Organizations (NGOs) and community-based organizations involved in water supply activities within Balaka and Machinga Districts;
ix. Members of the Village Natural Resources Management Committees (VNRMCs), Catchment Management Committees (CMCs) and Water Users Association (WUA); and
x. Project beneficiaries including their local leaders.

1.9 Methodology for carrying out an ESIA

The ESIA study was carried out in accordance with the Terms of Reference provided in Annex 1 by a team of experts provided in Annex 5. The strategies for executing this assignment followed the steps outlined below:

i. Examination of existing conditions of the project site;
ii. Examination of implementation approach and processes for the activities of the project;
iii. Identification and analysis of potential environmental and social impacts associated with the implementation of project activities which are likely going to be triggered and generated within and around project impact area; and
iv. Identification of appropriate mitigation measures for the predicted impacts and preparation of a management plan for addressing the environmental and social impacts during implementation and operation.

In order to achieve the objectives outlined above, the following activities were undertaken:

1.9.1 Literature Review

This involved the review of existing literature related to the project. The literature that was reviewed included the Project Appraisal Documents; Environment Management Act; Forestry Act; Water Resources Act; Occupational Safety, Health and Welfare Act; National Water Policy; National Environment Policy; Malawi National Land Policy; Malawi Development and Growth Strategy (III), Malawi 2063, among other pieces of relevant legislation and policies.

1.9.2 Field Visits

A number of field visits were conducted to the proposed Liwonde-Balaka Water Supply Project site between September 2019 to June 2022. This was done to enable specialists to acquaint themselves with the project area and surrounding communities. The field visits also enabled different specialists to observe and capture baseline data on the existing environment. Specialist studies that were conducted included archaeology and heritage, landscape and visual, ecology (flora and fauna), agriculture and socio-economic environment among others.

The studies assisted in identifying and assessing environmental and social impacts that might occur as a result of project implementation.

1.9.3 Stakeholder Consultations

During the Environmental and Social Impact Assessment studies, stakeholders were consulted. Details on stakeholders that were consulted have been included in Annex 2 of the report while issues raised during consultations have been comprehensively covered in Annex 3.

Stakeholders that were consulted include Balaka District Council, Machinga District Council, Non-Governmental Organisations, Mpira-Balaka Water Supply Trust, Department of Water Resources, Department of Water Supply and Sanitation. The consultations were aimed at soliciting information which was used during the environmental and social screening of the project. Specific objectives of the consultations included:

i. Communicate and clarify the objectives and activities for the proposed upgrading and expansion works for Balaka - Liwonde water supply systems;
ii. Increase public awareness about the proposed project to enhance their understanding;
iii. Facilitate and provide a forum for public dialogue and contribution on issues regarding the ESIA for the proposed project;
iv. Gather and verify environmental and socio-economic baseline information and constructive ideas to complement the ESIA preparation process for project;
v. Ensure that the ESIA development process helps to consolidate efforts made by SRWB and the local authorities in order to establish lasting relationships with affected communities and other stakeholders; and
vi. Ensure compliance with the national and international regulations.

The approach to the public consultations process was based on what is outlined in Appendix G of the 1997 Guidelines for EIA for Malawi. Thus, the principal stakeholders (Project Affected Persons) were engaged and more than two methods were used in the engagement process. The consultations were designed to allow for obtaining and cross-checking information obtained at all levels. The consultations included the following:

- Formal meeting and presentations to the District Coordination Team for Balaka and Machinga District Councils.
- Direct interviews with stakeholders, and particularly representatives of regional and district level governmental institutions, service providers and NGOs/CSOs; and

- Formal and informal meetings with affected people through focus group discussions and individual interviews through household survey.

Key issues established from the consultations are as follows:

- The locals anticipate that levels of water related diseases will be reduced. Additionally, they anticipate that the time they spend fetching water will be reduced and thereby increasing their time of productivity.
- The contractor should consider having more awareness meetings with the locals to ensure that early marriages and sexually transmitted diseases are avoided to both locals and workers especially during the construction phase of the project.
- The developer should sustain the benefits of employment opportunities and business by encouraging the community to save and engaging them in COMSIP projects. These projects should also involve female headed households as their levels of income are usually low as compared to male headed households.
- Construction works that are to be done within a forest reserve area, the procedure is that a contractor has to obtain an approving licence from the forestry department which stipulates the conditions under which the project works are to be done in order to ensure that the forest reserve area is protected
- The contractor to prioritise the following mitigation measures to conserve the environment and avoid community disturbances:
    a. Provide an alternative energy source at the campsites to keep workers from cutting down trees for firewood.
    b. Cover all trenches that may be excavated for laying of any new pipes to avoid inconveniencing people that may be using the sites of the trenches as walking pathways.
    c. Inform surrounding communities through sensitizations of any potential disturbances (such as noises) that may come as a result of the project works.
    d. Waste management plans (both construction and domestic wastes) should be generated at construction camp sites and clearly presented in the contractor's Environmental management plans.
- Minimise as much as possible, the hiring of migrant workers to avoid cases of influx of more people into the local communities that may cause disturbances into the social/cultural establishments of the locals and possibly lead to increased cases of crimes such as thefts.

Chapter 2: Detailed description of the proposed project

The proposed project to upgrade the Liwonde water supply system is developed in accordance with the requirements of the National Water Policy (2005) and United Nations' the Sustainable Development Goals (SDGs), and to supply the people of Liwonde and Balaka with safe and reliable water. The Project Development Objective (PDO), is to establish a reliable drinking water supply to the two towns of Liwonde and Balaka, taking into consideration the fast growing population of the two towns. In addition to the residents of the two towns, the project is also expected to benefit the growing numbers of public and commercial water consumers in the two towns.

The design and construction works associated with the proposed project is planned to be implemented within a period of 4 years. Works to be carried out are to include detailed designs, ground investigations, tendering, contract award and construction. The proposed project activities are classified in three phases namely: planning and design, construction and implementation.

2.1 Project Components/Activities

2.1.1 Planning and Design Phase

Main activities during the planning and design phase include:

i. **Pre-project assessments:** High level assessments regarding the proposed project to upgrade and expand the Liwonde-Balaka water supply systems have been conducted. The assessments were aimed at developing a project concept among from available alternatives. As a product of these assessments, a project appraisal report was developed in 2017, giving the established and proposed concepts for the project. The high level assessments were conducted from technical, financial and environmental perspectives.
ii. **Site identification and selection:** Identification and selection of sites to be utilized for access roads to the project sites for construction works is one of the main activities for the planning phase. The selection of the access road sites takes into account the need to minimize negative impacts on the natural environment, as well as the surrounding communities. As part of this planning phase, determination of sites for locating proposed facilities for the upgrading of the water supply systems have been made. Established sites include sites for proposed new water intake structure, new water treatment plant and a new clear water storage reservoir.
iii. **Technical Design:** The Southern Region Water Board is in the process of preparing detailed designs for the project. Activities being performed during this detailed design phase include surveying, site planning, preparation of maps, technical drawings and bills of quantities.
iv. **ESIA studies:** Environmental and Social Impact Assessment Studies are currently underway. Activities associated with this exercise include conducting baseline and socioeconomic surveys, desk studies, map preparations and public consultations.

The project is currently in the planning and design phase.

2.1.2 Construction Phase

Construction works will commence soon after completion of the detailed design and tendering works, and after all the necessary approvals and certificates have been approved and issued.

Prior to the commencement of the construction works, the following activities are planned for implementation:

- Establishment of Camp Sites;
- Transportation of people and equipment to and from the sites;
- Establishment of on-site access roads;
- Erection of work site signage and temporary fences where appropriate.

In general, the majority construction activities expected for a medium-large scale water supply project shall be included. These include land clearing, excavation of trenches, compaction base of the trenches where the pipes will lay, laying of the pipes, backfilling the trenches for laid pipes and the hauling of construction material etc. All these activities will have significant impact on the surrounding environment. Details concerning construction activities for the main infrastructure are discussed as follows:

2.1.2.1 Construction works to erect a new water intake and raw water pumping station on Shire River

The water intake for the project shall be located downstream of Liwonde Barrage (Shire River) at a newly constructed abstraction site. The abstraction site was constructed under Shire River Basin Management Program (Phase I) when Kamuzu Barrage was being upgraded. The water will then be pumped to the current treatment plant for Liwonde Water Supply thereafter it will be pumped to Balaka Township. Two booster pump stations will be constructed along the way up to Balaka Township to ensure that there is adequate pressure.

2.1.2.2 Construction works for the new raw water transmission main

The raw water transmission main is proposed to be constructed over a stretch of 2.5 km. The pipe is to run from the new intake structure to connect with a new water treatment plant which will be constructed next to the existing treatment plant in Liwonde. The existing Liwonde plant is located at the bank of the Shire River just upstream of the Liwonde barrage weed boom in the town. The raw water transmission pipe will be optimised to be in the order of diameter 350mm and will largely be constructed of polyethylene pipe material.

2.1.2.3 Construction of new water treatment plant

A new conventional surface water treatment plant will be constructed for Liwonde. The plant will have a treatment capacity of 10,000 m^3/day and will utilise a complete conventional treatment system comprising of units for coagulation, flocculation, sedimentation, filtration and disinfection. The plant will be built to have two parallel treatment lanes and will also include a clear water reservoir which will serve as a suction tank for high lift clear water pumps. Installations to facilitate necessary connections for power supply to the new treatment plant will also be done during the construction phase of the project. Installations for power supply will include the provision of power generators.

2.1.2.4 Installation of a pumping station at the new water treatment plant

A pumping station of two separate pumping systems will be constructed at the new water treatment plant. One system will pump water to clear water reservoirs in Liwonde and another system will pump treated water to Balaka. Three motorised pumps (two on duty and one on standby) each with a power rating of 30KW will be installed to pump water to tanks in Liwonde. On the other hand, four pumps (three on duty and one standby) each with a power rating of 55KW will be installed to pump approximately 5,000 m^3/day of treated water to Balaka. The pumps to deliver water to Balaka will be provided with soft starters and water hammer equipment to reduce dynamic pressure surges that may arise due to the long pumping

distances, and the large ground elevation delta of approximately 270m between Liwonde and Balaka. The two pumping systems to Liwonde and Balaka will have a combined pumping capacity of approximately 6700 m^3/day.

2.1.2.5 Construction of transmission mains to Liwonde and Balaka

Main pipelines to transmit treated water from the treatment plant to Balaka and Liwonde towns will be constructed of ductile iron pipes. The main transmission line to supply parts of Liwonde will span an estimated distance of 3km and will be of nominal pipe diameter of 300mm. The transmission main to supply parts of Balaka Town will be split into two sections; one spanning 25km, from the new treatment plant to Ng'onga hill along the Liwonde-Balaka M8 motorway, and another spanning 13.7km from the Ng'onga hill to the existing Sosola treatment plant (situated 3.5km west of Balaka Town centre). A storage reservoir will be constructed at Ng'onga hill into which the first section of the Balaka transmission main will terminate. The second section of the Balaka transmission pipe will start from this proposed tank at Ng'onga to the existing 1500m^3 clear water reservoir at Sosola.

Both sections of the Balaka transmission main will be of nominal pipe diameter of 350mm. Both transmission mains for Balaka and Liwonde will be provided with air valves at high points and washouts at low points. Isolation valves shall be foreseen at strategic locations as needed.

2.1.2.6 Construction of reservoirs

The project will also include the construction of storage reservoirs for treated water. A 1000 m^3 storage tank will be constructed at Ng'onga hill (UTM coordinate location 36L 718521E; 8337105N) along the Liwonde-Balaka M8 road. Pumped water from Liwonde will be supplied to this tank through the Balaka transmission main and the water will flow by gravity from this tank to the existing reservoir at Sosola.

Three additional storage tanks will be constructed at Liwonde, two of which will have a capacity of 500 m^3 and one will have a capacity of 1000 m^3. The storage tanks will be constructed of reinforced concrete. A high level balancing tank with a capacity of 50m^3 will also be constructed to aid with the operation of the booster pumps in the water supply system.

2.1.2.7 Construction of distribution pipelines to areas of Liwonde and Balaka towns

The project will construct additional distribution pipelines to expand the current water supply networks in the two towns of Balaka and Liwonde. Detailed designs for the expansions of the networks shall be made by the SRWB in close consultation with the administrative councils for the two towns. The designs will take into account the future developments of the two towns. The current plan is to extend the distribution networks by approximately 10km in each of the two towns. The distribution pipelines for the extension will comprise of pipes ranging from 50mm to 250mm in diameter.

2.1.2.8 Construction works for service outlet points

Under this project, an estimated 100 communal water points will be constructed in selected areas of Balaka and Liwonde towns. Along with the installation of the public water points, a targeted 5,000 individual water connections are expected to be made in the two towns. The service connections are planned to be made concurrently with the expansion of the distribution networks. Construction works for the connections will include construction of manholes and connector pipes. The project will also procure necessary equipment such as water meters to facilitate the connections.

2.1.2.9 Construction of Auxiliary Buildings

Construction of auxiliary buildings under the project will mainly include pump houses, guard houses, office blocks, staff houses, at sites proposed for reservoirs and at the new treatment plant.

2.1.2.10 Rehabilitation works at existing Liwonde and Balaka treatment plant

The project will also include rehabilitation works to the units at the current Liwonde and Balaka water treatment plant. In particular, electro - mechanical equipment such as pumps will be upgraded.

2.1.3 Operation and Maintenance Phase

For the demobilisation phase, all temporary works and structures will be removed as soon as possible following their end of use. These include temporary fences and barriers, workers' camp, scaffolding materials, work site signage, steel cuttings and materials stockpiles among others. The construction sites will be cleared and the affected areas will be appropriately restored. Negative impacts may arise from the modes utilised to remove the temporary structures and their disposal upon the completion of the construction works.

During the operation phase, the activities performed will include water abstraction, transmission, treatment, storage and distribution to consumers. It is expected that individual service connections for the water supply systems will carry over to the project operation phase. Other activities performed during this phase include maintenance of the equipment and infrastructure for efficient delivery of the water supply services to the consumers. Pumping of the water will primarily utilize electricity from the Electricity Supply Corporation of Malawi (ESCOM). However, back-up power generators will be installed under this project.

2.1.3.1 Labour and material requirements for project activities

Excavation of trenches will be achieved using excavators and soil compaction will be done using trench compactors. Excavator and compactor operators and assistants, including labourers and plumbers will be employed by the project contractor. Employment opportunities will consider, where possible, the recommendation of the Malawi gender policy to ensure that a ratio limit of 40-60 (Women-Men) % is achieved. Out of the project workers employed during the construction phase, approximately 45% are expected to be employed as casual (non-skilled) labourers from the surrounding communities. The rest are expected to be skilled and semi-skilled workers including engineers, surveyors, environmental health and safety workers and foremen.

Construction of reinforced concrete tanks will require machinery such as crawler dozers for clearing the project sites and excavators for digging foundations. Concrete mixers and vibrator pokers will be required for the concrete works. In addition, labourers will be required to perform functions including shaping the foundations and concrete works. It is estimated that 30 people will be employed for these activities. Tippers will be used for movement of materials such as quarry stones, gravel and sand.

In general, the proposed Balaka-Liwonde water supply systems expansion project is expected to generate an estimated 13,000 person-years of direct temporary employment during the construction phase (SRWB Liwonde-Balaka project appraisal report, 2017).

At operation phase, it has been estimated that SRWB will employ an additional 15 people to operate the new assets that will be installed under the project. Table 2.1 presents number of

people to be employed during Constriction and Operation Phases of the project and their expected categories.

Table 2.1: Number of people to be employed by category

Category	Number
Construction Phase	
Civil Engineers	2
Mechanical Engineers	2
Electrical Engineers	2
Plumbers	15
General fitters	15
Unskilled labourers	100
Stores Clerks	4
Security Guards	10
Subtotal	**150**
Operational Phase	
Plumbers	5
General Fitters	5
Watchmen	5
Subtotal	**15**

Table 2.2 presents some of the major plant, equipment and materials that will be required for the construction works to upgrade the Liwonde and Balaka water supply systems. The table also gives the project outputs and by-products that are to be expected from use of the equipment and material.

Table 2.2: Major equipment and materials

SN	Equipment or material	Use of the equipment or material	Source of the material	Output or product/ by-product
1.	Crawler Dozer	Creation of access roads and clearing construction sites	To be provided by the contractor	Access roads and construction sites/ dust, noise pollution
2.	Excavator	Excavation of trenches	To be provided by the contractor	Compacted trenches, firm foundation bases/ dust and noise pollution
3.	Trench compactor	Compaction of trenches	To be provided by the contractor	Compacted beds for pipes and foundations/ noise pollution
4.	Concrete mixer	Mixing concrete	To be provided by the contractor	Well mixed concrete/ noise, air pollution

SN	Equipment or material	Use of the equipment or material	Source of the material	Output or product/ by-product
5.	Tippers and trucks	Transportation of construction materials such as fine/course aggregate, sand and cement.	To be provided by the contractor	Various construction materials/ dust and noise pollution
6.	Vibrating pokers	Concrete compaction	To be provided by the contractor	Well mixed concrete/ noise
7.	Carpentry tools	For carpentry works during construction	To be provided by the contractor	Complete constructed formworks for concrete work
8.	Plumbing and brick laying tools	For plumbing and brick laying works during construction	To be provided by the contractor	Laid pipes and supporting brick/masonry structures
9.	Fine and course aggregate	For concrete formulation	To be sourced locally. Course aggregate could be sourced from nearby quarries	Completed structures
10.	River sand and gravel	For concrete formulation and other construction works including use in filters for treatment of water	To be procured from suppliers	Completed structures including filters for water treatment,
11.	Cement	For concrete formulation and other construction works	To be sourced locally or outside the country depending on quantity, quality and cost factors.	Completed concrete/brick structures
12.	Water	For concrete formulation and other construction works	To be sourced from approved suppliers	Potable water/ Polluted water
13.	Reinforcement metal bars	For concrete reinforcement	To be sourced locally	Reinforced concrete water tanks and structures
14.	Cement bricks	For various construction structures	To be made locally	Brick structures
15.	Pipes and fittings	For water pipelines	To be sourced locally or internationally depending on quality	Pipelines for water delivery

SN	Equipment or material	Use of the equipment or material	Source of the material	Output or product/ by-product
			specifications and cost	
16.	Hypochlorite solution	For water treatment	Local shops and imports	Treated, potable water

The activities listed above and all the other activities related to the implementation of the project may cause positive and negative environmental impacts for which the enhancement and mitigation measures are discussed in this ESIA report.

2.1.3.2 Project Cost

The cost for implementing the project has been estimated. The estimates have been prepared based on rates obtained from similar projects recently completed. Table 2.3 provides a summary of the estimated costs for the components of the proposed project to upgrade the Liwonde and Balaka water supply systems.

Table 2.3: Cost estimate for the proposed project

No	ITEM	COST (€)	COST (MWK)
1	New intake and raw water pumps	300,000.00	262,185,000.00
2	Raw water transmission main connecting intake – new Liwonde Water Treatment Plant (WTP)	640,000.00	559,328,000.00
3	New water treatment plant of 10,000 m³/d capacity at Liwonde	3,970,000.00	3,469,581,500.00
4	Rehabilitation of existing Liwonde WTP	200,000.00	174,790,000.00
5	Pumping station at new WTP	930,000.00	812,773,500.00
6	Clear water transmission mains to Liwonde and Balaka	7,100,750.00	6,205,700,462.50
7	New reservoirs	1,412,000.00	1,234,017,400.00
8	Distribution systems expansion and service outlet connections for Liwonde and Balaka	3,420,000.00	2,988,909,000.00
9	Contingencies	3,594,550.00	3,141,456,972.50
	Sub-total for construction costs	**21,567,300.00**	**18,848,741,835.00**
	Cost for design and supervision	2,156,730.00	1,884,874,183.50
	GRAND TOTAL	**23,724,030.00**	21,946,911,000.00

The total estimated cost is €23,724,030.00 or MWK 21,946,911,000.00, converted using a rate of €1= MWK 926.03, quoted on the Reserve Bank of Malawi website on 20th January 2022. This cost estimate for the proposed project is to be revised and may change after final checks are made to the design.

2.1.3.3 Environmental Considerations

The scope of the proposed project has been developed after a different number of alternatives for implementing the project were assessed. The outcome of the assessment led to the recommendation of constructing a new water intake on the Shire River, a water treatment plant,

pumping stations, reservoirs and main water supply piping to supply more water to Liwonde and Balaka Towns through pumping and gravity. The following environmental considerations were taken into account when coming up with the recommended project scope:

i. The Shire River is a vast water resource with consistently reliable flow and it's use as an abstraction point relieves the pressure that is currently being faced by the Mpira Dam in Ntcheu District. The Mpira Dam has recently been experiencing perilously low water levels due to climate change factors and increased water supply demand from its supply catchment area. A significant portion of water from the dam (about 23.4 l/s) is currently purchased by SRWB to supply water to Balaka Town. The development of this proposed project to abstract water from Shire River to supply the town of Balaka will imply that the SRWB will stop depending on the dam for water supply from this dam. This will in turn save the Mpira Dam from the increased demand which was mostly from the growing urban population of Balaka; thus contributing to the restoration of an important water resource.
ii. The option of the Shire River for abstraction also spares other limited water resources that are located near Balaka Town which might have been considered i.e. the Rivirivi River which passes west-east at the south of Balaka.
iii. The combination of both pumping and gravity for water supply to Balaka significantly reduces the demand for energy/power that would have otherwise been much higher if the only option considered was direct pumping of water to Balaka. An increased power demand which would have come from implementing the latter option would have been a substantial contributing factor to an already inadequate power supply system for the country to the country. The option to reduce demand for power therefore saves the resource and indirectly also protects the country's trees to which people normally turn to for firewood/charcoal during power shortages.

2.1.3.4 Waste Management

Table 2.4 details how various kinds of waste generated due to the proposed project will be managed:

Table 2.4: Management of waste generated from the proposed project

Type of Waste	Approximate Quantities	Source	Management
Concrete	1 tonne per month	Concrete waste from construction activities	• Concrete waste will be restricted from entering storm drains or any nearby watercourses. • Concrete trucks and other concrete-coated equipment will be washed at the project sites. Wastewater from the washings will be directed to soak ways that will be constructed on designated washing sites. • Concrete waste will be dumped into temporary concrete washout facilities/pits. • A sign will be installed adjacent to each temporary concrete washout facility to inform concrete equipment operators to utilize the proper facility. • Concrete waste will also be used to backfill borrow pits.
Oils	40 litres per month	Used oil from vehicles, plant and machinery	• Used oil will be kept for oiling shutters during other construction activities.
Steel	50 kg per month	Steel offcuts from cutting and welding activities	• All steel offcuts will be stockpiled in a designated protected area. • The steel offcuts will later be sold to recycling companies.
Tyres	20 tyres (Project duration)	Worn-out tyres from vehicles and machinery	• Worn tyres will be kept for recycling. • If the tyres cannot be recycled, they will be sold off to other potential users (i.e. shoe makers).
Saw Dust	100 kilograms	Saw dust sourced for use as absorber	• Saw dust will be used as an absorber in areas prone to oil leaks to avoid soil contamination. • Other saw dust will be thrown into waste collection bins and arrangements will be made to responsibly disposed of the waste at dedicated waste disposal sites for the Balaka and Liwonde Town Councils.

Type of Waste	Approximate Quantities	Source	Management
Plastic Papers and other plastics	5 kilograms per month	Office activities	• These will be recycled where possible. Otherwise they will be placed in bins then thrown into waste collection skips and arrangements will be made to responsibly disposed of the waste at dedicated waste disposal sites for the Balaka and Liwonde Town Councils. Use of thin plastic papers will not be allowed at all project sites to adhere to the ban by the Malawi Government on the production, distribution and use of thin plastics of thickness less than 60 microns.
Office Papers	10 kilograms per month	Office activities	• These will be recycled where possible. Otherwise they will be placed in bins then thrown into waste collection skips and arrangements will be made to responsibly disposed of the waste at dedicated waste disposal sites for the Balaka and Liwonde Town Councils.
Food waste	50 kg per month	cafeteria	• All food waste will be deposited into a nearby dust bin and later into a rubbish pit. • After some time the rubbish pit will be covered with a layer of soil to avoid flies and to facilitate decomposition.
Human waste	50 kg per month	Workers	• Pit latrines will be constructed at construction sites to allow for proper disposal of human waste.
Exhaust Fumes	Not measurable	Plant and machinery	• Machinery will be well maintained and the most modern machines will be used, where possible.

Chapter 3: Project Alternatives Considered

3.1 The "No Action" option

Since there is already clean water supply infrastructure serving the towns of Balaka and Liwonde, there are no other feasible/ cost effective alternatives identified other than the upgrading and rehabilitation of the existing water supply facilities. This is necessary so that the systems will not only have the capacity to supply safe water to the people residing in the two towns presently, but also to amply supply those that will be residing in the towns and their immediate surrounding communities in the future.

With this said, the socio-environmental consequences of a "no action" option are that:

- People of Liwonde and Balaka towns would not have access to adequate potable water and efficient water supply services.
- Those that do not have piped water would continue to utilize unsafe, and at times unreliable water supply sources.
- Women would continue to bear the burdens of fetching water from long distances and girls would have to spend more time helping their mothers to fetch water, consequently limiting their time that would have otherwise been utilized for school.
- Many people, especially children and the elderly, would be exposed to water related ailments stemming from the use of unsafe water.
- The national economy would miss out on the possible benefits of increased revenue generation from the customers of the SRWB, more taxes for the government as well as job and associated business creation opportunities that would come due to the proposed project.

On the other hand, the "no action" option would mean that the project-associated negative environmental and social impacts would not be felt by the communities in the project and surrounding areas. Also, the environment, as well as natural resources would be spared from the project negative effects.

3.2 Technical Alternatives

Various alternatives were analysed regarding the implementation of the proposed project from both technical and economical outlooks. The options mainly were about the possible water sources for the proposed project, the water pumping regime for delivery of water to Balaka as well as the location of new water intake structure and treatment plant. Details concerning the alternatives are as presented as follows:

a. Alternative Water Sources

a) *Mpira Dam:* This option involves the supply of water to Balaka by increasing of the current amount of 23.4l/s of water which SRWB is able to purchase from the Mpira-Balaka Water User Association. This option has advantages and disadvantages which have been discussed as follows:

Advantages

- Capital Cost will be relatively small because of a number of factors such as distance and required infrastructure for expansion; and
- Issues of related to compensation or displacement of people will be relatively small considering that the project would use the existing route for the pipes.

Disadvantages

- Mpira Dam will not meet the required water demand by SRWB due to a number of factors including climate change affecting rain fall in Mpira Dam catchment area, illegal diversion of

water by farmers from Mpira River and siltation of the dam which has affected its holding capacity, among other reasons.

Having weighted advantages and disadvantages of this option, it has been decided that the use Mpira Dam as a source of water for the project is not a viable option.

b) *Exploring of more groundwater sources:* This option involves the supply of water to Balaka by drilling more boreholes to add to the current water supply. SRWB has a number of motorised high-yielding boreholes(4) that augment water supply from Mpira Dam. This option has advantages and disadvantages which have been discussed as follows:

Advantages

- The capital cost of this intervention will be relatively small as compared to use of Shire River as source of water for the upgrading project;
- Issues of related to compensation or displacement of people will be relatively small.

Disadvantages

- Most of the boreholes drilled in the area including those from the well field are low yielding;
- The other problem with the groundwater in the area is that it mostly contains an increased mineral content, a thing which results in complaints from customers; and
- High mineral content of groundwater will require costly treatment processes.

Having weighted advantages and disadvantages of this option, it has been decided that Groundwater is not a viable option.

c) *Building a dam on the Rivirivi River:* This option involves the supply of water to Balaka by constructing a dam on the Rivirivi River which passes west-east at south of Balaka Town. Advantages and Disadvantages of this option were weighed as follows:

Advantages

- Rivirivi River is relatively nearer as compared to Shire River as such issues of relocation may be relatively small if the dam that may be constructed is small in size.

Disadvantages

- The area has flat topography which would limit the amount of water to be impounded;
- This option will relatively be expensive because the other cost will go towards the construction of the dam;
- Catchment degradation has led to low discharge and increased sedimentation of the river;
- The project would displace a number of people as such issues of compensation and relocation will be rampant.
- Having weighted advantages and disadvantages of this option, it has been decided that construction of a dam on Rivirivi is not a viable option.

d) *Constructing an intake structure on the Shire River:* This option will involve using Shire River as a source of water for the project. This will be done by constructing a water intake on shire, downstream upgraded Kamuzu Barrage. Under the proposed project it is planned that there will be construction of a new intake at the Shire River; construction of a new water treatment plant; installation of pumping facilities for delivery of the treated water; construction of water storage tanks as well as distribution networks and provision of materials to house connections and

communal water points. This option has advantages and disadvantages which have been discussed as follows:

Advantages

- Shire River is a vast reliable source with a strong permanent flow. Due to its vastness, the water at the intake site will not necessarily require building of a dam.

Disadvantages

- This option is relatively expensive because of the long distance that will be covered (of more than 20km) and other costs associated with pumping of over such a long distance; and
- The project will require relocation of a number of people and infrastructure as such there will be huge costs associated with compensation.

Having weighted advantages and disadvantages of all the options on water sources that have been presented above, it has been decided that construction of a water intake on Shire River is a viable option. Shire River will provide the required amount of water for the project.

b. Alternative Construction materials

An analysis of alternative construction materials to be used for the proposed project was made as follows:

a. Stones or rocks

Stones or rocks for the construction of intake structure and other ancillary structures can be sourced from one of the quarry mines closer to the project area. Stones are strong and when used in construction as durability is guaranteed as long as mortar of the required strength is used.

Advantages:

- These are environmentally friendly as they do not require fuel wood or water to produce;
- Stones are relatively stronger than concrete blocks, concrete bricks and baked or burnt bricks;
- Use of stones for construction of canals reduces water losses due to seepage;
- Use of stones may not require plastering as such this can contribute to reduced cost.

Disadvantages:

- When stones are used for construction, relative a bigger amount of mortar is used because of their uneven shape; and
- Stones could be relatively more expensive that burnt or baked bricks.

b. Concrete blocks or bricks

Concrete blocks and bricks are made from a mixture of quarry dust, cement and sand to which water is added. The mixture is put in a molder and compacted using a manual machine to ensure strength and quality. The molder for concrete bricks is different from molder for concrete blocks.

Advantages:

- Concrete blocks or bricks allow users to produce uniform blocks or bricks of greater strength;
- Concrete blocks or bricks can be made on site so transportation costs are minimized; and
- Because Concrete blocks or bricks do not need fire as is the case with burnt bricks, there is no fuel wood needed thereby helping to curb deforestation as such they are environmentally friendly.

Disadvantages:

- These are relatively more expensive to buy as compared to burnt bricks;

- Concrete blocks or bricks are not as strong as stones as such expect to have some damaged blocks or bricks during transportation of handling; and
- Concrete block or bricks require plastering after construction and this may increase the cost of construction.

c. Use of traditional or ordinary burnt bricks

The traditional or ordinary burnt bricks are made from soil that is mixed with water, dried in the sun there after baked using wood fuel. This is the type of building material is used by a lot of people and has contributed greatly to deforestation in the country.

Advantages:

- Bricks are strong and durable;
- They require low maintenance cost;
- Have excellent thermal mass i.e. in winter they keep the buildings warmer while in summer they keep the buildings cooler; and
- They are fire resistant.

Disadvantages:

- Contribute greatly to deforestation;
- Using burnt bricks to construct canals can compromise the durability of the canals as the bricks can absorb water and become marshy.

Having looked all the options for the choice of construction materials that are available to us, the use of burnt bricks was not a preferred option. This is so because the deforestation that is associated burnt bricks as burnt bricks use require firewood for baking. In addition, burnt bricks are structurally weaker than the other construction materials such as stones and concrete blocks.

c. Alternatives on pumping regimes to deliver water to Balaka Town

Options assessed in this regard include the following:

- Direct pumping from Liwonde to clear water storage reservoir at Sosola treatment plant;
- Pumping from Liwonde to a high point "Hill" and gravity supply from this high point to Sosola reservoir;
- Either of the options i and ii, but providing an (online) booster pumping station at a strategic location between Liwonde and Balaka or the high point "Hill".
- Either of the options i, ii and iii, but supplying directly into Balaka Town instead of supplying to tank at Sosola.

The alternative ii is opted for over which the water is to be pumped to a high point tank to be constructed at Ng'onga hill, then gravity supply is carried out to the reservoir at Sosola treatment plant. This option is selected mainly because it cuts down on the costs for pumping the water with the incorporation of gravity flow. This option also provides room for possibilities of effectively supplying the water to trading centres such as Chiendausiku that are located between Liwonde and Balaka Towns.

Chapter 4: Policy and Legal Framework

This chapter summarizes the policy, legal and administrative framework within which the ESIA was carried out. It also identifies relevant international environmental/social agreements that may be related to the project.

4.1 Policy Framework

4.1.1 Malawi Vision 2063

Malawi Government published Malawi Vision 2063 in 2020 as a successor of Vision 2020 as a long-term development strategy. The Malawi Vision 2063 aims to transform Malawi into a wealthy and self-reliant industrialized upper middle-income country by the year 2063.

There are three pillars of Malawi Vision 2063. These are: Pillar 1-Agricultural Productivity and Commercialization; Pillar 2- Industrialization, and Pillar 3-Urbanization. The Vision also has Six enablers. Enabler 1: Mindset Change; Enabler 2: Effective Governance Systems and Institutions; Enabler 3: Enhanced Public Sector performance; Enabler 4: Private Sector Dynamism; Enabler 5: Human Capital Development; and Enabler 6: Economic Infrastructure.

The Water Supply project falls under Pillar 5 (Human Capital Development) where the objective is to have globally competitive and highly motivated human resources. Pillar number 5 has the following focus areas that include: Education and skills development; Science, Technology and Innovation; Health and Nutrition; Managing Population Growth; Water, Sanitation and Hygiene; Sports and Creative Arts; Sports and Creative Arts; and Gender equality & equity and Social Welfare. Water Sanitation and Hygiene envision that the Government shall take the lead and rally partners and communities in promoting the adoption of safe water and sanitation practices at the individual and household level. This shall include the provision and promotion of the use of improved and accessible sanitation facilities.

In this regard, the proposed Liwonde-Balaka Water Supply Project will go a long way in fulfilling the aspirations of Malawi Vision 2063.

4.1.2 The National Environmental Policy (NEP, 2004)

The NEP is a central guide for all environmental and natural resources sectoral activities. Hence, the EIA Guideline for Water Sector Projects (GoM, 2006), recognises the National Environmental Policy (NEP) as a key instrument that provides standards or benchmarks for water policies and legislation in Malawi.

The overall goal of the NEP is ***"The promotion of sustainable social and economic development through sound management of the environment in Malawi"*** *and* some of the goals that the NEP seeks to accomplish are:

a) Securing for all person's resident in Malawi now and in future, an environment suitable for their health and well-being;
b) Promoting efficient utilisation and management of the country's natural resources;
c) Facilitating the restoration, maintenance and enhancement of the ecosystems and ecological processes essential for the functioning of the biosphere and prudent use of renewable resources.

In view of the above, the NEP relates significantly and directly to the activities of the proposed upgrade of the Liwonde water supply including Balaka town project considering that water is a natural resource that must be managed and utilised sustainably for the betterment of both present and future generations. Section 5.5 of the NEP clearly stipulates that a cross-sectoral objective of the water sector is to manage

and use water resources efficiently and effectively, so as to promote its conservation and availability in sufficient quantity and acceptable quality.

4.1.3 The National Water Policy (2005)

This policy provides an enabling framework for integrated management and utilization of water resources in order to provide water of acceptable quality and sufficient quantities in Malawi. The policy also intends to ensure availability of efficient and effective water and sanitation services that satisfy the basic requirements of every Malawian; and for the enhancement of the country's natural ecosystem. Realising the challenges, threats and opportunities associated with implementation of activities in the water and sanitation sector similar to the proposed project, the GoM through the Ministry of Agriculture, Irrigation and Water Development established the policy tailored at tackling any issues in the sector in an integrated manner, through involvement of all concerned stakeholders, including communities.

In general, the policy advocates for protection of water resources from unsustainable utilization, which may result in its depletion and degradation through pollution. The Southern Region Water Board will make sure that its project does not degrade the water sources by pollution throughout all the phases of the project.

4.1.4 National Gender Policy (2015)

The National Gender Policy, which is currently undergoing review, calls for integration of gender responsiveness in planning and implementation of development projects and programmes. It is understood that consideration of gender needs and benefits enhance poverty reduction in both rural and urban environments. During the implementation of this project SRWB will ensure that the needs of males, females and other vulnerable groups are integrated in the project activities. These include equal employment opportunities to both male and female including vulnerable groups.

The Government of Malawi has made efforts to improve gender equality, for instance in 2002 the Ministry of Gender, Child Welfare and Community Services created a Multi-Sector Country Gender Profile in order to identify the areas of society that need the most attention in regards to gender inequities. Despite governmental efforts, women in Malawi face many challenges when it comes to household and everyday decision-making.

4.1.5 National Forest Policy (2016)

The policy aims at promoting sustainable contribution of national forests, woodlands and trees towards the improvement of the quality of life in the country by conserving the resources for the benefit of the nation and to the satisfaction of diverse and changing needs of Malawi population, particularly rural smallholders. The policy prevents unnecessary changes in land-use that promote deforestation, or endanger the protection of the forests which have cultural, biodiversity or water catchment values. It also discourages development activities in gazetted forests unless proven to be environmentally friendly for which suitable inter-sectoral and local consultations will be conducted. Above all, the policy advocates for carrying out of environmental and social impact assessment where actions are likely to have significant adverse impacts on important forests and other resources. This Environmental and Social Impact Assessment for the project is in line with provisions of the policy. The developer therefore will be required to take advantage of provisions under this policy to prevent unnecessary destruction of forest resources and related resources in the project area.

In addition, Southern Region Water Board, in collaboration with Forestry Department through District Forestry Officers for Balaka and Machinga, will support afforestation programs in the two districts to replace trees that may have been affected during the implementation of the project. It is envisaged that

during construction Phase of the Project, there is likely going to be vegetation clearing so as to pave way excavation activities.

4.1.6 National Sanitation Policy (2008)

The goal of the National Sanitation Policy (NSP) is to promote effective coordination and develop mechanisms for the delivery of sanitation and hygiene promotion at national level. The NSP aims at providing a framework for development of programmes and initiatives that shall address sanitation and hygiene challenges as cited in the policy. These programmes will contribute to improving the health and quality of human life, a better environment and a new way for sustainable wealth creation.

The NSP is linked with other relevant government policies and programmes, among them the Constitution of Malawi revised in 1995 which enshrines responsible management of the environment to provide a healthy living and working environment for all the people of Malawi; also linked to the NSP is the Malawi Growth and Development Strategy, which was developed in 2006, and among other things seeks to increase access to clean water and sanitation, improve the nutritional status of children and ensure food security; furthermore the NSP is linked to the National Environmental Policy, adopted in 2004 which outlines the need for pollution control and the proper disposal of wastewater, solid waste and the protection of water bodies, with the general principle of 'polluter pays'.

Among other policy directions, the policy spells out that all sectors of the economy shall be obliged to address issues of improved sanitation and hygiene promotion in their development agenda and that enforcement of responsible disposal of litter, human waste including excreta or urine in public places shall be enhanced.

The implication of the policy is that the developer should among other obligations regulate pollution control in collaboration with all relevant stakeholders and oversee the water quality adherence to ensure that water quality standards established in the Water Act and related legislation are not violated. Further, Southern Region Water Board will ensure that the Contractor for the project has adequate sanitation facilities, such as toilets, to ensure that human excreta is properly disposed of.

4.1.7 National HIV and AIDS policy (2012)

The Policy highlights that HIV and AIDS impact on the country is quite significant and affects a range of socio-economic activities be it in agriculture, fisheries, public sector, private sector, tourism, urban areas, rural areas, among others. HIV prevalence in the country varies from one region to the other and from rural to urban areas. The highest rate is in the Southern Region and the lowest in the Northern Region. Prevalence rate is high in urban areas as compared to the rural areas.

National HIV Policy identifies migrant workers and women among highly vulnerable people to transmission of HIV and AIDS and other sexually transmitted diseases. In addition, increased disposal of income from migrant workers may enhance some workers to indulge in extra-marital affairs within the surrounding villages. These sexual activities would enhance the spread of HIV and AIDS among workers and local people.

In line with this policy, SRWB has an HIV and AIDS Policy at an organisation level. During the project implementation period, the developer will conduct civic awareness meetings in the project area that will help in disseminating information to women and girls on STI and AIDS issues. In addition, the developer will also consider employing women that are capable to do the work throughout the project to reduce economic stress which is one of the factors that make most women more likely to become infected and affected by HIV.

4.1.8 Malawi National Land Policy (2002)

The National Land Policy of 2002 focuses on land as a basic resource common to all people of Malawi. It provides the institutional framework for democratizing the management of land and outlines the procedures for protecting land tenure rights, land-based investments and management of development at all levels. It ultimately seeks to promote optimum utilization of Malawi's land resources for development. The policy provides opportunities for the people of Malawi to embark on a path of socially and environmentally sustainable development. In addition, the policy highlights a number of approaches for addressing problems facing the land resources sector. The policy requires that an environmental and social impact assessment be undertaken for all big land development projects and those planned in fragile ecosystems, in order to protect biodiversity and water resources. In addition, the policy:

1. Recognizes several sectoral policies and strategies in physical planning, fisheries, environment, forestry and mining, and for this reason, it encourages multi-sectoral approach in land use and management at local and district level;
2. Recognises social actions that influence and control people's use of land and realises that the rights of women, children and the disabled are usually denied on the basis of customs and traditions; or disregarded due to prejudice and lack of effective presentation. In view of this and of the increasing land pressure due to population growth, the policy calls for clear consideration of gender and the rights of children and the disabled (including those affected by the HIV and AIDS pandemic) in planning and implementation strategies of land based investments.

The Land Act, among other things, deals with issues of ownership, land transfer, use of land, and compensation. It is expected that the construction of pipeline from Liwonde to Balaka is expected to affect people's property although most of the pipeline will be aligned within the Road Reserve. As a consequence SRWB will be required to compensate individuals who are likely going to be affected by the project before its implementation.

4.2 Legal Framework

4.2.1 Constitution of the Republic of Malawi (1995)

Section 13, part d, accords for managing the environment and sustainable development of natural resources to prevent degradation; provide a healthy living and working environment for the people of Malawi; accord full recognition to the rights of future generations; and to conserve and enhance the biological diversity of Malawi. Thus, it paves the way for the Environment Management Act. The project developer must comply with the "section" through adhering to the provisions of the Environment Management Act and implementation of the Environmental Management Plan (ESMP) as provided in this ESIA report.

Regarding protection of property rights, the Constitution has three key sections on the subject (Section 28, 24 and 44). Section 28 entrenches the right to property. It provides that "*every person shall be able to acquire property alone or in association with others, and that no person shall be arbitrarily deprived of property.* According to s. 44(2), *"expropriation of property shall be permissible only when done for public utility and only when there has been adequate notification and appropriate compensation, provided that there shall always be a right to appeal to a court of law".* In Malawi, the courts have held that this constitutional protection of property rights avails to customary and registered land alike.

Under Section 13 (e), it is the responsibility of the state to achieve gender equality for women through: full participation of women in all spheres of the Malawian society, on the basis of equality with men; implementation of principles of non-discrimination and such other measures as may be required; and implementation of policies to address social issues such as domestic violence, security of the person, maternal benefits, economic exploitation and rights to property.

The project developer will have to ensure that activities during all phases of the project promote environmental protection and sustainable development of natural resources, including water and biological diversity resources. The project also has to promote gender equality and human rights as stipulated in the Constitution of Malawi.

4.2.2 Environment Management Act (2017)

The Environment Management Act makes provision for the protection and management of the environment and the conservation and sustainable utilization of natural resources.[1] The Act is the principal piece of legislation on the protection and management of the environment.[2] Under Section 6, the Act states that 'subject to the constitution, where a written law on the protection and management of the environment or the conservation and sustainable utilization of natural resources is inconsistent with any provision of the Act, the written law shall be invalid to the extent of the inconsistency.'

In order to integrate environmental and social considerations in projects, the Act provides for environmental planning and the need for Environmental and Social Impact Assessment (ESIA). The environmental planning is required to be done both at national and district levels. Section 31 of the Act is on environmental and social impact assessments. The Act stipulates that the Minister may, on the recommendation of the Malawi Environment Protection Authority (MEPA), specify by notice published in the Gazette, the type and size of project which shall not be implemented unless an Environmental and Social Impact Assessment is carried out. It also specifies that a person shall not undertake any project for which an Environmental and Social Impact Assessment is required without the written approval of the Authority, and except in accordance with any conditions imposed in that approval.

Section 26 (3) of the Act provides that a licensing authority shall not issue any license with respect to a project for which an ESIA is required under the Act unless the Director has certified in writing that the project has been approved by the Minister or that an ESIA is not required under the Act.

Guidelines for Environmental Impact Assessment were put in place in December 1997. These guidelines provide a list of projects for which an ESIA is mandatory and for the steps that must be followed when preparing an ESIA. According to the Guidelines, all water supply projects that involve water withdraws from rivers and lakes and construction of major water pipes require and ESIA. Such being the case the project that is being implemented by SRWB is one of the prescribed projects for which an ESIA is mandatory.

4.2.3 Water Resources Act (2013)

The Water Resources Act (2013) provides for the management, conservation, use and control of water resources; for the acquisition and regulation of rights to use water; and for matters connected therewith or incidental thereto.

Part VIII, Section 89 (1) prohibits any person who owns, controls, occupies or uses land on which an activity or process is or was performed to pollute water resources and which, unless authorized under this Part, causes, has caused or is likely to cause pollution of a water resource. The Act tasks all occupiers of land to prevent pollution from occurring, continuing or recurring. As such it is an offence to alter the flow of or pollute or foul any public water. The Act defines pollution or fouling of public water to mean the discharge into or in the vicinity of public water or in a place where public water is likely to flow, of any matter or substance likely to cause injury whether directly to public health, livestock, animal life,

[1] See the Long title of the Act
[2] Section 7 of the Act

fish, crops orchards or gardens which such water is used or which occasions, or which is likely to occasion, a nuisance.

The Act further prohibits any person to divert, dam, store, abstract or use public water for any other purpose except in accordance with the provisions of this Act. In compliance with provisions of the Water Resources Act, SRWB applied for a water abstraction permit issued under the provisions of Water Resources Act (2013) by National Water Resources Authority. Further, the expansion of water supply from Liwonde to Balaka will necessitate abstraction of more water from Shire River to meet the growing demand as such SRWB will apply for variation of water abstraction permit to reflect the required volume in line Section 49(1) of the Act.

4.2.4 Land Act (2016)

The Land Act of 2016 makes provision for land in Malawi and for all matters incidental or connected thereto. The Act, among other things, deals with issues of land ownership, land transfer, use of land and compensation. The issues of land tenure and land use are recognized as critical in sustainable environmental management in Malawi. The Act clearly defines security of tenure. This is essential as people are more inclined to properly manage land that belongs to them.

In accordance with Section 18 of the Act, any person who suffers any disturbance of, or loss or damage to any interest which he may have or, immediately prior to the occurrence of any of the events referred to in this section, may have had in such land, shall be paid such compensation for such disturbance, loss or damage as is reasonable.

It is expected that the construction of pipeline from Liwonde to Balaka may affect some peoples' property such being the case there will be need for SRWB to compensate all the projects affected persons (PAPs) in accordance to the provisions of the Act.

4.2.5 Land Acquisition Act (2017)

The Lands Acquisition Act provides procedures which have to be followed by developers when acquiring land of any tenure in the country. These procedures will be followed as provided under this Act. Section 3 of the Act provides for the payment of fair compensation on acquisition of land by compulsory or by agreement. The compensation can be paid as a lump sum or by instalments as has been provided for in Section 9 of this Act. To ensure fair compensation, Section 9 provides that an assessment for compensation will have to be carried out taking into account the following aspects:

1. The amount of money that the owner of the land paid when acquiring it;
2. The value of the improvements on the land, standing crops and growing produce; and
3. Appreciation in the value of the land since the date of acquisition.

The Act, in Section 5, provides that the owners of the land that is to be acquired should be given a notice of the intention to acquire their land which should be served on the people and also published in the Government gazette. Accordingly, SRWB will prepare a Resettlement Action Plan (RAP) and all the PAPs will be given notice on the intention of SRWB to acquire passage to construct water supply pipes.

4.2.6 Forest Act, (1997)

The Act guides the management of indigenous forests on customary and private land; forest reserves and protected forest areas; woodlots and plantation forestry. The Act also deals with crosscutting issues including law enforcement and fire management.

Part VI of the Act covers issues of afforestation. This section provides for the promotion of tree growing in forest reserves, public land, customary land and private land. In line with this Section of the Act, Southern Region Water Board will collaborate with District Forest Officers for Balaka and Machinga by promoting afforestation programs in the two districts with an aim of replacing trees affected by construction activities.

4.2.7 Occupational Safety, Health and Welfare Act (1997)

The Act regulates work conditions with respect to safety, health, and welfare of workers. The duty of ensuring safety, health, and welfare of workers rests with the employer. However, every employee is required to take reasonable care for his/her own safety and that of other workers.[3]

In compliance to the requirements of the Act, SRWB will ensure that the Contractor for the construction works will develop an Occupational Safety, Health and Welfare Policy and program. Furthermore, according to Section 58 (Part VI) all workers for the construction works will be provided with appropriate personal protective equipment (PPE) and these include work suits, industrial boots, hard helmets and gloves during the construction period.

In addition, the Contractor shall ensure that a well-stocked First Aid Box is made available at the construction site for use by workers as provided for under Section 33 (Part IV) of the Act. The First Aid Box shall be under the charge of a well-qualified person. In line with Part II, Section 6 of the Occupational Safety, Health and Welfare Act, the contractor shall register the construction camp as a work place.

4.2.8 Fisheries Conservation and Management Act (1998)

An Act making provision for the regulation, conservation and management of the fisheries of Malawi and for matters incidental thereto or connected therewith.

Section 43(1) stipulates that no person shall disturb, injure, poison, kill or detrimentally affect any fish, fish spawning ground, including any aquatic plant life or food for fish in any river, stream, lake or other part of the fishing waters by casting, discharging, introducing or allowing to fall, flow or percolate into such waters any sawdust or sawmill refuse, oil, chlorinated hydrocarbon, biocide, pesticide, toxic or any other substance, heavy metal or other material or rubbish which could lie on the bed of such waters.

In line with Section 43, Southern Region Water Board will ensure that activities of the water supply project do not lead to pollution or discharge of materials that may kill or detrimentally affect aquatic life including fish in Shire River, the source of raw water supply for the project. In order to ensure that pollution of Shire River is avoided or minimised during implementation of project activities, Southern Region Water Board has carried out an Environmental and Social Impact Assessment studies for the proposed project before its implementation.

4.2.9 HIV and AIDS (Management and Prevention) Act, 2018

The HIV and AIDS Management and Prevention Act of 2018 makes a provision for the prevention and Management of HIV and AIDS; provides for the rights and obligations of people living with HIV or affected by HIV and AIDS; and also provides for the establishment of National AIDS Commission.

Section 4 is on the prohibition of harmful practices and Section 5 is on subjecting another person to harmful practices; Section 6 is on prohibition of HIV and AIDS discrimination; Section 7 is on the rights and duties of persons living with or vulnerable to contracting HIV; while section 8 is on rights of persons affected with HIV.

[3] Section 18

In line with provisions of this Act, SRWB will ensure that the Contractor for water supply project does not tolerate any act of discrimination against people living with HIV. In addition, pre-employment testing of people seeking employment will not be tolerated as this is prohibited under Section 26 of the Act (Part VIII-Employment). Additionally, the contractor will ensure that people living with HIV are given equal employment opportunities.

4.2.10 Gender Equality Act (2012)

An Act to promote gender equality, equal integration, influence empowerment, dignity and opportunities, for men and women in all functions of society, to prohibit and provide redress for sex discrimination, harmful practices and sexual harassment, to provide for public awareness on promotion of gender equality and to provide for connected matters. Section 6 (1) of the Act states that a person who commits an act of harassment if he or she engages in in any form of unwanted verbal, non-verbal or physical conduct of a sexual nature in circumstances, would have anticipated that the other person would be offended, humiliated or intimidated, and (2) a person who sexually harasses another in terms of the foregoing subsection is liable to a fine and imprisonment specified under subsection (2).

Section (7) of the Act makes provision for Government to take active measures to ensure that employees have developed and are implementing appropriate policy and procedures aimed at eliminating sexual harassment in the workplace.

In line with the provisions of this Act, SRWB will ensure that it promotes gender equality in all project activities. Further, SRWB will ensure that the contractor for the water supply project has a fair representation of all sexes when it comes to employment. SRWB ensure that the contractor engages at least 30 percent of the labour force as women. However, it is envisaged that this may be too difficult to achieve considering that construction sector is male dominated.

4.2.11 Public Health (Amended) Act, 1992

Public Health Act of 1948, as amended in 1992, amends and consolidates the law regarding the preservation of public health. Section 59 of the Act prohibits any person from causing nuisance on any land or premises owned or occupied by him. The developer should therefore not cause any nuisance during the construction and implementation of the project.

The Act under Part X requires developers to provide adequate sanitary and health facilities to avoid harmful effects of waste on public health. Further, section 82 prohibits persons from disposing of certain matters into public waters. The matters include petroleum spirit and any substance that may cause injury to public health. The developer will have to comply with the requirements of this Act by providing for waste disposal facilities in accordance with the anticipated volumes of waste. The developer will further have to comply with the relevant provisions of the Act which are aimed at the preservation of public health.

Section 88 stipulates the requirements for separate toilets for both male and female persons in public buildings. In order to comply with the requirements of the Act, SRWB will ensure that the contractor for the project provides adequate toilets for both men and women during the construction phase of the project including other waste receptacles such as waste bins.

4.2.12 Public Health (Corona Virus and COVID -19) prevention, containment and management) Rules, 2020

These rules may be cited as the Public Health (Corona Virus and COVID-19) (prevention, containment and management rules, 2020.

Part II of the rules is on general preventative measures on the spread of the corona virus. This part of the rules is subdivided into two divisions i.e. Division I and II. Division I covers rules to prevent spread of corona virus by individuals while division II covers measures by government to prevent, contain and manage the spread of COVID 19.

According to Fourth Schedule of the rules which is on Workplace Guidelines, SRWB will ensure that the contractor for the project provides workers with protective personal equipment (PPE) including facilities with which to wash hands and hand sanitizers. The contractor shall also ensure that social distancing among the workers is maintained as such there should be enough working space.

4.2.13 Water Works Act (1995)

The Water Works Act provides for the establishment of Water Boards and water-areas; and for the administration of such water-areas as well as for the development, operation and maintenance of waterworks and water-borne sewerage sanitation systems in Malawi; and for matters incidental thereto or connected therewith. The Act is thus relevant for the development of the water supply infrastructure including the pipelines, tanks and all other related structures for the project.

Part III, section 11 of the Act gives powers to the Southern Region Water Board to develop, construct and maintain all works as are necessary and convenient for the purpose of creating, maintaining and extending water supply for domestic, public and business purposes. The proposed upgrading and extension of Liwonde water supply including Balaka town project is in line with this act as it aims at extending water supply for domestic and business purposes.

4.2.14 Local Government Act (1998)

The Act, as read with Section 146 of the Republican Constitution, provides the mandate to the Local Councils in planning, administration, and implementation of various development programmes in their areas. It further provides for environmental functions, which include urban management, local planning, local afforestation programmes and control of soil erosion, among others.

Machinga and Balaka District Councils, like all other District Councils in the country, have a District Environmental Sub-committee (DESC). The DESC looks at all environmental issues in the district under the coordination of the Environmental District Officer. During consultations for the ESIA studies for the proposed Liwonde-Balaka Water Supply Project, the consultant engaged with the DESC to ensure that environmental and social issues are incorporated during the planning and implementation of the project.

Further in line with the Act, Southern Region Water Board has created a platform for performance of environmental functions by creating/strengthening VNRMCs. The VNRMCs will, among other functions, implement afforestation programs in the project area to replace trees that may have been affected by implementation of the project.

4.2.15 Physical Planning Act (2016)

The Act provides for the town and country planning at national, district and local level. It sets forth the provisions to prepare, approve and deposit a plan and establishes an administrative framework for development planning. The Act also provides for development control and enforcement by approving district and local physical development plans and ensuring that such plans are in line with the National Physical Development Plan which SRWB as developer is required to comply.

SRWB as a developer is required to submit the designs of infrastructure related to the project for approval by respective District or Town Councils before implementation of the project. This will ensure that the

designs and proposed locations for construction of the infrastructure are in line with the zoning plans for the councils.

4.2.16 Employment Act (2000)

The legal framework for child labour in Malawi is contained in the Employment Act of 2000 (CAP 55:01). The Act sets the minimum age for admission of a child to employment at 14 years. The Act further prohibits children between the ages of 14 and 18 to work in hazardous work. The definition of "hazardous" fulfils at least one of the following work conditions:

i. working in designated hazardous industries, namely tobacco, mining, quarrying and construction;

ii. working in designated hazardous occupations, namely those listed in the Employment act of 2012 (Prohibited hazardous work, CAP 55:02);

iii. working for more than 40 hours per week;

iv. working in other hazardous conditions, namely working at night, being exposed to hazardous working environment, carrying heavy loads, operating any dangerous machinery/equipment at work or begging.

In line with provisions of this Act, the Contractor for the construction of Liwonde-Balaka Water Supply Project will ensure that under-aged people (less than 18 years old) are not employed in the construction works and even during operation phase of the water supply project.

4.3 ESIA Administrative framework

Under Section 31 (1) of the Environment Management Act (2017), the Minister responsible for Environment may, on the recommendation of the Malawi Environment Protection Authority established under section 7 of the Act, specify, by notice published in the Gazette, the type and size of a project which shall not be implemented unless an Environmental and Social Impact Assessment is carried out. The Director is empowered, under the Act, to require changes to a project in order to reduce environmental and social impact and to reject a project, if, in his/her view, the project will cause significant and irreparable injury to the environment. A person not satisfied with a decision of the Director may appeal to the Environmental Appeals Tribunal.

According to Section 25 of the Act, the Malawi Environmental Protection shall establish Advisory Committees as advisers, consultants, reviewers or technical experts to assist in the conduct of its regulatory responsibilities. The advisory committee shall review all ESIA reports and make recommendations to the Malawi Environment Protection Authority Board for Approval.

4.4 Regulatory licences and approvals

Table 4.1 summarises all regulatory licences, approvals and standards that have to be obtained or met for the proposed project to ensure that the project activities are in line with sound environmental management practices and comply with the relevant legislation.

Table 4.1: Regulatory licences and approvals relevant for the project

No	Regulations/ Standards/Approvals	Description	Reference	Issuing Institution
1.	Environmental and Social Impact Assessment Certificate	The certificate is provided after approval of the ESIA report.	EMA, 2017	MEPA

No	Regulations/ Standards/Approvals	Description	Reference	Issuing Institution
2.	Water Abstraction Permit	Allows the abstraction of groundwater or surface water	Water Resources Act (2013)	National Water Resource Authority
3.	Approval of the project design	Approval of project design, where applicable, will be required where construction is to take place in planned areas	Machinga and Balaka by-laws; and the Physical Planning Act (2016)	Machinga and Balaka
4.	Planning Permit	To ensure that project is implemented within Balaka District Council and Liwonde Town Council Development Plans.	Local government	Liwonde Town Council and Balaka District Council
5.	Workplace Registration Certificate	This regulates workers safety and health	Occupational Safety Health and Welfare Act (1997)	Department of Occupational Safety, Health and Welfare

4.5 Zambezi Watercourse Commission (ZAMCOM) Principles

The ZAMCOM agreement aims at promoting equitable and reasonable utilization of the water resource of the Zambezi Watercourse as well the efficient management and sustainable thereof. Article 14 (1) of the agreement states that member state planning any programme, project or activity with regards to the Zambezi Watercourse or which may adversely affect the watercourse or any other member state shall forthwith notify the secretariat therefore and provide the commission with all available data and information with regards to the project.

Article 12 of the agreement lists principles that are to be followed in order to achieve the agreement's aim. These principles include; principle of sustainable development; principle of sustainable utilization; principle of prevention of harm; principle of precaution; principle of inter-generational equity; principle of assess of trans-frontier impacts; principle of cooperation and principle of equitable and reasoning utilization. The proposed Liwonde-Balaka water supply project is expected to be carried out according to the ZAMCOM agreement by following the agreement's principles throughout the project cycle.

4.6 Environmental Standards in Malawi

During the construction and operation phase, the project will also trigger a number of Environmental Standards set by the Malawi Bureau of Standards as provided in Table 4.2. The SRWB and the contractor must ensure that the standards are met.

Table 4.2: Relevant Environmental Standards

Standard	Title	Year of Implementation
MS 214:2013 (second Revision)	Drinking Water – Specification	2013
MS 714:2005	Occupational Safety and Health Management Systems - Specification	2005

MS 719:2005	Hazardous Waste – Management, Classification and Disposal – Code of Practice	2005
MS 59:2002	Solid waste – handling, transportation and disposal – code of practice	2002
MS 730:2005	Solid waste disposal sites, guidelines for design	2005
MS 539:2013	Industrial effluents- Tolerance limits for discharge into inland surface waters	2013

Chapter 5: Description of the Project Environment

5.1 Physical Characteristics of the Project Area

5.1.1 Spatial location

Liwonde Town is in Machinga District which is located in the Eastern Region of Malawi. The district borders with Mangochi District in the North, Zomba District in the South, Balaka District in the West and the Republic of Mozambique in the East. Liwonde Town is approximately 101km from Blantyre and 258km from Lilongwe District. Liwonde is located between latitudes 9.9'S and 33º97'S; and longitudes 34º17'E and 34º 18'E.

On the other hand, Balaka Town is located in Balaka District in the Southern Region of the Republic of Malawi. The district is bordered by Machinga to the East, Ntcheu to the North- West, Zomba to the South East, Mangochi to the North, Machinga to the East, Neno to the South West, Blantyre to the South. The district is 201km from Lilongwe, the capital city of Malawi, and about 127km from Blantyre district. The district is located between latitude 14º 58' 0"S and longitude 35º 30' 0"E and covers an area of 2193 km^2

5.1.2 Climate (Rainfall and Temperature)

i.Temperature

Machinga district experiences 2 seasons; dry and wet. The dry season is between May to October, and the wet season is between October and March. Minimum temperatures range from 14^0C to 22^0C in June and July, while the maximum temperatures range from 22^0C to 33^0C between October and November.

Climate in Balaka district is tropical. The district experiences two seasons; summer which is between June to August and a rainy season which is between October and April. May and September are transitional months. The lowest temperatures range from 15.5^0C to 22.7^0C between June and July, while the highest temperatures range from 24.4^0C to 31.6^0C between October and November.

ii.Rainfall

Precipitation in Machinga district is affected by topography. Rainfall is both conventional and orographic in nature. Liwonde town being a low-lying area, experiences low and unreliable rainfall due to it being mostly convective. Liwonde Town experiences average rainfall of 750mm per year.

The average annual rainfall for Balaka district is 750mm. The onset of rains is usually the end of October with majority of the rains occurring in the months between December and February.

5.1.3 Topography

Machinga district has a topography ranging from an elevation of 482 to 794 metres above sea level. The district has generally flat terrain around Liwonde, which spreads to mountainous and hilly zones of Malosa-Liwonde forest reserve, Ntaja Escarpment and Lungwe Hills in TA Nyambi.

Balaka District has a topography ranging from an elevation of about 350 to 800 metres above sea level. The topographical features in the district comprise of ridges and natural drainage systems. The district is dominated by plateaus with isolated hills found around the district.

5.1.4 Soils

The soils in Machinga and especially area around Liwonde town has ferruginous, calcimorphic and lithosols type of soils. Calcimorphic soils are found in the form of mopanols and alluvial soils which are usually very fertile. Eutric soils are also common in the area. These soils have coarse grains and are light

in texture with good air circulation. Balaka has alluvial soils, often calcimorphic, lithosols, mopanosols, gleys and ferruginous. Types of soils in both districts determine land use and types of crops planted in the different area.

5.1.5 Geology

The Machinga area is underlain by rocks of the Malawi basement complex. In some cases blanketed by drift and colluvium. Various rock types are found in Machinga district, some of which are biotite-bearing felsic gneisses, gneisses containing pyroxene, hornblende, biotite, and garnets dominate the area. Different geographic features have different rock types; Lake Chiuta plain is mostly covered by thick superficial soil and weathered pelitic, semi-pelitic, quartzo-feldspathic, and calc silicate rocks, while the distinctive hill group of Nabwasi, Nafisi, and Nsili represents eroded remnants of perthiticsyenite and granitic intrusions among others. In the lowlands, rock outcrops are very rare due to thick and widespread soil. There are many evident morphological breakups that may be referred to as faults. The drainage pattern of the district also indicates some preferential trends that could be related tohidden structures.

The most conspicuous and dominant physical feature of Balaka district are the plateaus with isolated hills found around the district. Majority of the water bodies (rivers/streams) are seasonal. These natural drainage channels are narrow with steep slopes.

5.1.6 Hydrology

There are both underground and surface water sources in Machinga district. Underground water sources include; aquifers, boreholes and shallow wells while surface water sources include; rivers, streams and lakes. Flow direction of groundwater is influenced by the geomorphology of the area. Generally, water flows perpendicular to equipotential planes, flowing from places with higher heads to places with low heads. Hence, the groundwater flow direction is predominantly to the South-East and partially to the East into the Shire River. However, metamorphic rock aquifers cause convergences and divergences in the flow which develops local weathered zones and local aquifers, which are recharged and establish regional continuity during the wet season as the water level rises.

Water resources in Balaka District exist in two major categories; surface and ground water. Surface water consists of rivers and streams while ground water sources consist of springs, boreholes, and shallow wells. Poor land husbandry practices including cultivating along river banks and increase in population, have degraded catchment areas and marginal lands and has accelerated soil erosion, resulting in sedimentation of rivers. Hence the presence of dry spells and floods in most areas of Balaka district. Inadequate sanitary facilities, agrochemical run-off, and lack of proper waste disposal facilities have also contributed to the deterioration of the quality of water resources.

The proposed project to construct a new system to supply more water to the Towns of Balaka and Liwonde will see an increased abstraction of some 10,000 cubic meters of water per day. This is an equivalent of 0.116 M^3/s of water. The Shire River which is also a major tributary of the Zambezi River has recorded minimum annual flows of between 100-120 M3/s. Therefore, it is observed that the amount of water that is to be abstracted under this proposed Liwonde Balaka water project is only about 0.097-0.116% of the recorded minimum annual flows in the river.

Additionally, flows in the Shire River as well as in the Zambezi River are influenced by water levels in the Lake Malawi which is the main water body draining into the Shire River. Lake Malawi water levels are mainly influenced by evaporation from its vast surface area of 29,600 sq.km. The average evaporation rate from Lake Malawi is 1,500 cubic m per second, this is far greater than the amount of water that is to be extracted from this proposed project. It is thus concluded that water levels in the Shire River will be far more affected by evaporation than by the amount of water by the proposed Liwonde-Balaka Water

Supply Project. It is hence very evident that the abstraction amount of 10,000 M^3/day has a negligible effect on water levels in the Shire River.

Also in terms of water quality, the total residual chlorine levels of the backwash wastewater from the new treatment plant will not exceed the maximum limit for industrial effluent discharge into surface waters of 1mg per l (the recommended maximum amount to be consumed by humans, MBS-MS 539:2013).

It is therefore concluded that through the Liwonde Balaka Water Supply Project as far as water abstraction is concerned, Malawi will be realising more benefits from the shared watercourse system of Lake Malawi-Shire-Zambezi River, as well as ensuring adequate protection of the watercourse system.

5.2 Biological Characteristics of the Area

5.2.1 Flora

The study area has three types of vegetation namely closed canopy woodland, mixed savannah woodland and mopane woodland. Other minor vegetation types are perennial wetland grassland and open canopy woodland on hills and scarps. The most common plant genera that occur in the study area are *Brachystegia-Julbernardia-Combretum-Uapaca* and *Colophospermum mopane* plant species among others (Malawi Government, 2013). The assessment of flora species was done using transect walks along the proposed route of the pipelines, at the weir, treatment tank and water pumping site, and on areas where water storage tanks will be constructed. All flora species that were seen during the field survey were identified and recorded in a field notebook. Plants that could not be identified onsite were photographed or their specimens were collected for identification at the place of lodging, using the Flor a Zambesiaca volumes and various field guides. Particular attention was paid to species of conservation concern (i.e. endemic, protected and endangered species).

The vegetation type recorded included *Brachystegia floribunda, B. longifolia, B. boehmii* and *Julbernardia paniculata, Erythrophloeum africanum, Marquesia acuminata, Uapaca kirkiana, Combretum molle* and *Eichornia craspes (Namasupuni).* None of these tree species are protected trees under IUCN RedList and the National Forest Act of 1997.

5.2.2 Fauna

5.2.2.1 Birds

According to the International Union for the Conservation of Nature (IUCN) Red List, Malawi has 11 species of birds that are listed as endangered, threatened and vulnerable (BirdLife International 2004), as well as several additional species of particular concern (Dowsett-Lemaire, Dowsett & Dyer 2001). These species are also covered under the Convention on International Trade for Endangered Species (CITES).

Information on avifauna or birds was obtained through literature review and field surveys during which site Global Positioning System (GPS) readings were recorded to relate the species and their location. Sampling of avifauna was by walking through the distinct microhabitats of the survey area and making observations using binoculars. Indirect evidence (nests and feathers) was used to identify bird species available. Mist nets were also used, constructed in a transect line, to get those bird species that could not easily be observed. These birds were extracted from the mist nets, identified and released within the locality. Bird calls or songs were also used in the identification of bird species present in the study site. Semi structured questionnaires were administered to some selected key people within the study sites, for information on the birds they knew existed in the area and were verified using bird field guides.

During the survey 40 bird species were recorded in Liwonde Balaka area. One bird species recorded was threatened as per the IUCN Red List status but it occurs in Liwonde National Park which is outside the project area and therefore the impact will be very minimal. Annex 4.1 shows a checklist showing the distribution of these species across various taxonomic categories.

5.2.2.2 Mammals

Mammal species were recorded incidentally while surveying birds. Indirect evidence such as dung was used to confirm presence of mammal species in the proposed project area, in conjunction with limited visual or audio confirmation. Similarly, mammal species were surveyed twice in the morning, twice in midday and twice in the evening in all the six transects that were established on the proposed project site.

There are also mammal species that occur in the project site and the majority of these mammal species are small mammals such as mice (*Mus spp.)* common hare (*Lepus microtis*) and rodents (*Rodentia spp*.). Large mammals are confined only to protected areas such as Liwonde National Park and the Shire River (Malawi Government, 2013).

During the studies, 18 mammal species were also observed and all are outside both the IUCN Red List and National List as have been presented in Annex 4.2. Therefore, the project will have minimal impact on the mammal fauna.

5.2.2.3 Reptiles

Countrywide there are 124 reptile species listed in Malawi. These include snakes, lizards, chameleons and tortoises. The Nile crocodile *Crocodylus niloticus*, is generally wide spread in the Shire River and Lake Malawi. Reptiles play a very important role in nutrient cycling within the ecosystems and population control of their prey.

Information on reptiles was collected through literature review and field visits. The field sampling involved opportunistic sampling and drift fences. When carrying out 'opportunistic sampling' specimens were mainly sampled opportunistically, during visual surveys of all habitats. Surveys were undertaken during the day and during the evening. Search techniques included visual scanning of terrain (using flashlight by night) and refuge examination (e.g. lifting rocks and logs, peeling away bark and exfoliating rock flakes, scraping through leaf litter, etc.). Acoustic monitoring of all available habitat types was also applied.

There were about 13 reptile species that were observed in the proposed project area (Annex 4.3). Due to low diversity of habitat in the area of proposed development there is lower diversity of reptile fauna. Endemism in Malawian reptiles is low and most endemic species associated with montane habitat are not found in Liwonde Balaka area, therefore outside the IUCN Red List and National category. Thus the proposed development will have minimal impact.

5.2.2.4 Amphibians

There are 74 amphibian species recorded in Malawi and about 33 species occur in southern Malawi and which may also occur in the area of the proposed development. Twelve threatened species occur mainly in the highlands. There are four endemics, all four of which are threatened namely *Phrynobatrachus astewartue* in Rumphi near Nyika Plateau, *Hyperolius mertensi* on Nyika Plateau, *Ptychadena broadleyi* in Mount Mulanje, and Zomba and *Arthloleptis francei* in Mount Mulanje; Six species, with two species occurring exclusively on Mulanje Mountain and the remaining four on Nyika Plateau and Zomba Mountains as well as Rumphi. Six genera are restricted to Malawi (Channing, 2001). However, several frog species have restricted ranges although all extend into the three regions of Malawi. Information for

amphibians were obtained through literature review, field surveys. Field visits were carried out to get primary data. Field sampling involved Opportunistic sampling and Drift fences.

About 4 species of amphibians were observed in the project area. These included Guttural toad (*Bufo gutturalis*), Flat-backed toad (*Bufo maculatus*), Mueller'splatanna (*Xenopus muelleri*) and Gray tree frog (*Chiromantis xerambelina*), and are outside the IUCN Red List category and the National Red List status. Therefore, the impact by the project on the amphibian species will be minimal.

5.2.2.5 Fish Species

Fish were surveyed by careful visual observations in water bodies such as rivers and fish ponds present in the study area. Species of fish that could not be identified on-site were photographed and ultimately compared to photographed fish species available in various fish field guides that were taken so that they could be accurately identified at least to species level.

Fish species that were recorded in the study site included *Oreochromis lidole* (Chambo), *O. karonge* (Chambo), *Bagrus meridiondis* (Kampango), *Tilapia shirensis* (Makumba), *Haprochronis* (Kambuzi), *Labeo mesops* (Ntchira), *Opsaridium microcephalus* (Mpasa), *O. Microlepis* (Sanjika), *Hippopotamyrus discorhynchus* (Mphuta), *Barbus paludinosus* (Matemba), *Engraulicypris sardella* (Usipa) and *Claris liocephalus* (Mulamba).

Twelve fish species were recorded during the survey and two species *Oreochromis lidole* (Chambo) and *O. karonge* (Chambo) were endangered under the IUCN Red List status and the rest were not threatened. At the intake these species were not recorded, however the pumps at the intake have been designed in such a way that fish cannot get inside during abstraction. Therefore, the project will have minimal impact on the fish fauna.

5.3 Socio-economic setting

5.3.1 Land use patterns

Land tenure systems in Machinga and Balaka districts are in two categories namely; public land, which comprises of government, customary and private land, and are either leased or freehold.

Machinga district has a total of 3,711km^2 (equivalent to 371,169 hectares). Fifty-seven percent (57%) of the total land is slated for agricultural activities, 11% is for forest reserves and protected areas, 0.3% is occupied by water resources i.e. Lakes Chiuta, Chilwa and Malombe, 29% is government land and the rest is utilized by the government.

Balaka district has a total of 2,117km^2 (equivalent to 211,716 hectares). From the total land size, 15% is occupied by wetlands, 5% is for public use, 57% for farming, 7% for settlements, 5% for estates and 11% is agricultural forest.

From the household assessment, it was noted that land in the project area is mainly public and customary in nature. Land is mainly used for agricultural and residential purposes. However, there is a small percentage of people with unused land especially in Balaka town.

5.3.2 Settlement Patterns

The settlement in Machinga district is in both nuclear and linear patterns. This is dependent on whether it is an urban or rural setting. The settlement in the rural setting is nuclear, as the other side of land is reserved for agricultural purposes. Linear pattern is mainly in the urban areas especially in trading centres. People settle in linear pattern close to the main roads so that they can take advantage of the

business opportunities in the trading centres. Liwonde town has been growing rapidly in recent years. This is attributed to developments that take place in the town and the tourism industry.

There are both formal and informal settlements in Balaka town. The formal housing is categorized into low, medium, high and traditional housing areas. Clustered patterns are mainly in trading centres and Balaka Township.

5.3.3 Population Characteristic

According to the National Statistics Survey report, the population of Balaka and Machinga Districts are 438,379 and 1,148,611 respectively (NSO Report 2018). The project area in Balaka is covering TA Nsamala which has population of 80,912 people while in Machinga District, the project is covering TA Sitola with a population of 25,138 people. The project intends to supply water to the fore mentioned areas targeting a population of 98,198 for both Liwonde (49,194) and Balaka (49,004) by the year 2027 (SRWB Investment Profile August, 2017). Specifically, the project will supply water to the following areas in Balaka; Sosola, Mpulula, St. Augustine, Chingeni and Chiyendausiku and Kaudzu village in Machinga

During the household survey, the average household size for Balaka District was 4 people and Machinga was 5 people per household, with most of the households being male headed.

5.3.4 Tribe and Ethnicity

5.3.4.1 Balaka Town

The Yao, Ngoni, Lomwe, Mang'anja, Chewa, and Sena are the main ethnic groups in Balaka town. The Yao constitute a major ethnic group in the district with 40 % (GoM Balaka SEP 2017-2022). However, results from the baseline household survey shows that the project area is dominated by the Ngoni tribe with 42.6% and is seconded by the Yao with 39%. The data also shows that there are a number of other ethnicities in the area such as Chewa, Tumbuka, Sena and Lomwe as indicated in Figure 5.1.

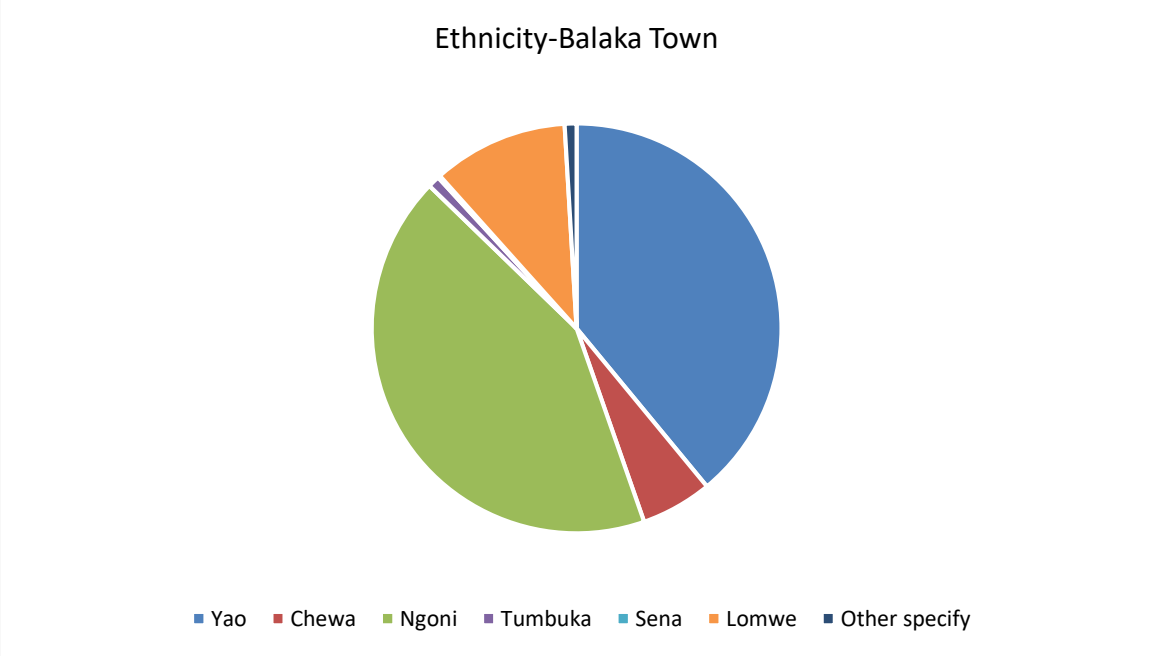

Figure 5.1: Ethnicity-Balaka Town (Household Survey August, 2019).

5.3.4.2 Machinga (Liwonde)

Yao and Lomwe are the main ethnic groups in Machinga District. The Yao account for 50% of the population in the district seconded by Lomwe at 40%. From the household survey, various ethnic groups where identified in the project area of Liwonde. These include Yao, Sena, Lomwe, Ngoni, Chewa and other ethnicities including the Mang'anjas. The Lomwe account for almost half of the ethnic groups at 44.4% of the population, seconded by Yao with 28.9% of the sampled population as shown in Figure 5.2.

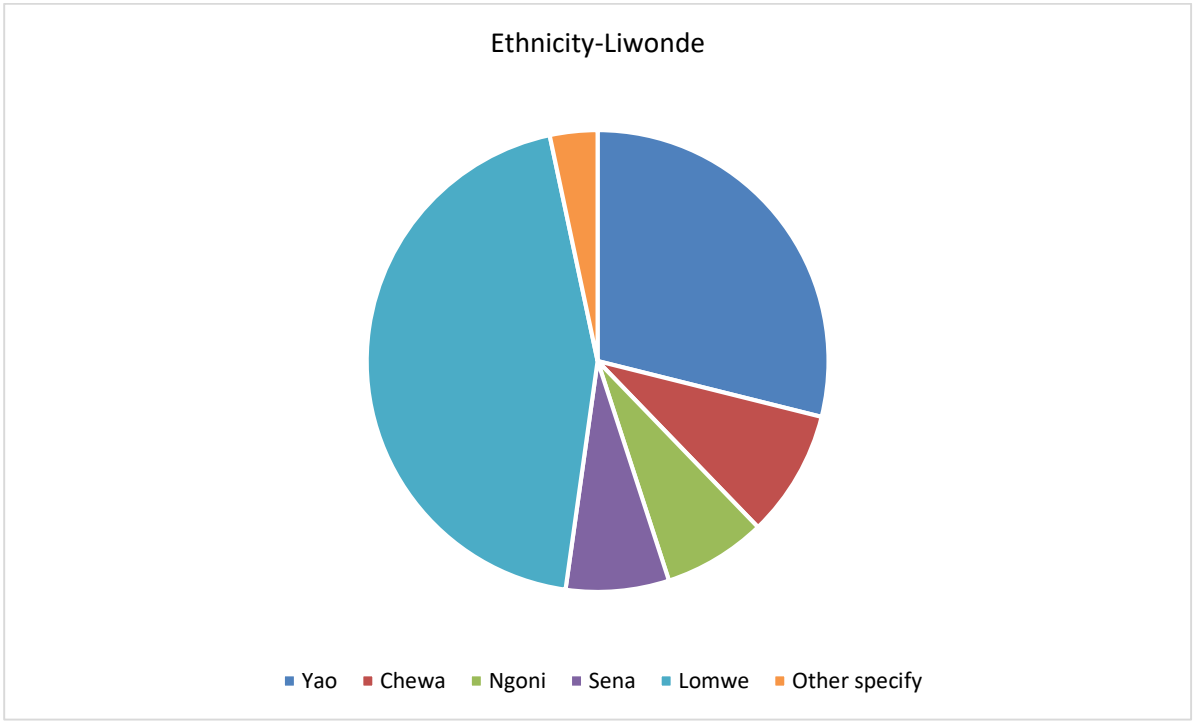

Figure 5.2: Ethnicity-Liwonde (Household Survey August, 2019).

5.3.5 Religion

According to the baseline household survey that was conducted during the field investigations, 3 religious groups were identified in the project area (Balaka Town); Christianity comprising of 56.7%, Islam 42.6% and other religious groups with 0.8%. Figure 5.3 shows the composition of the religions in Balaka Town.

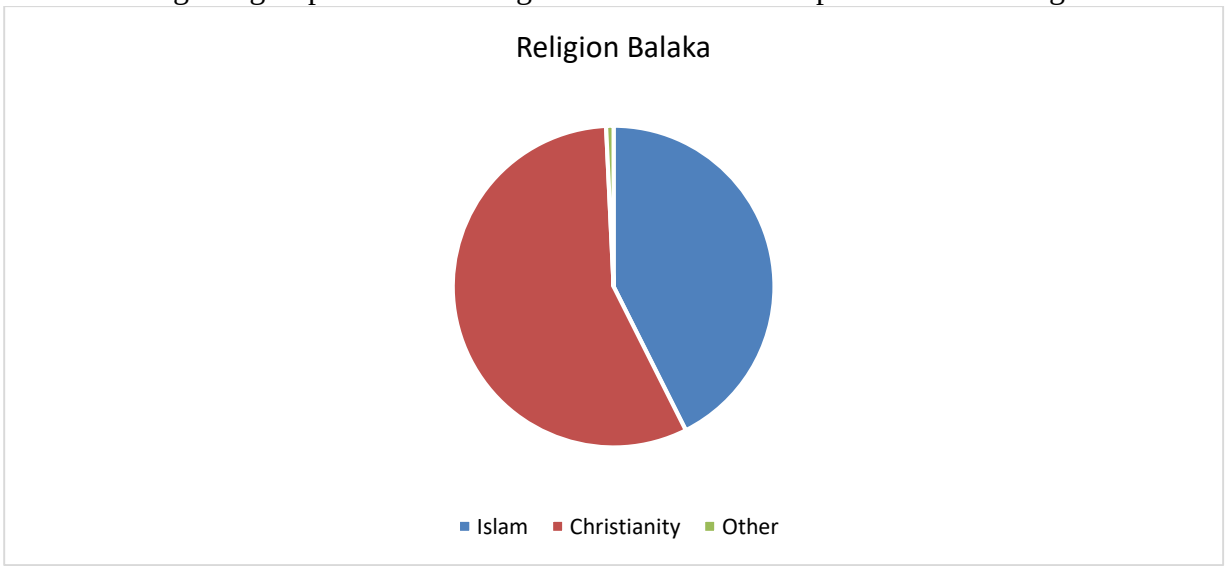

Figure 5.3: Composition of the religions (Household Survey August, 2019).

On the other hand, only 2 religious groups were identified in Liwonde Town. These are Christianity and Islam. Christianity dominates the area with 66.1% of the population despite Machinga District been predominantly Muslim. This could result from Liwonde being a religiously diverse town. Figure 5.4 shows the composition religious groups in Liwonde Town.

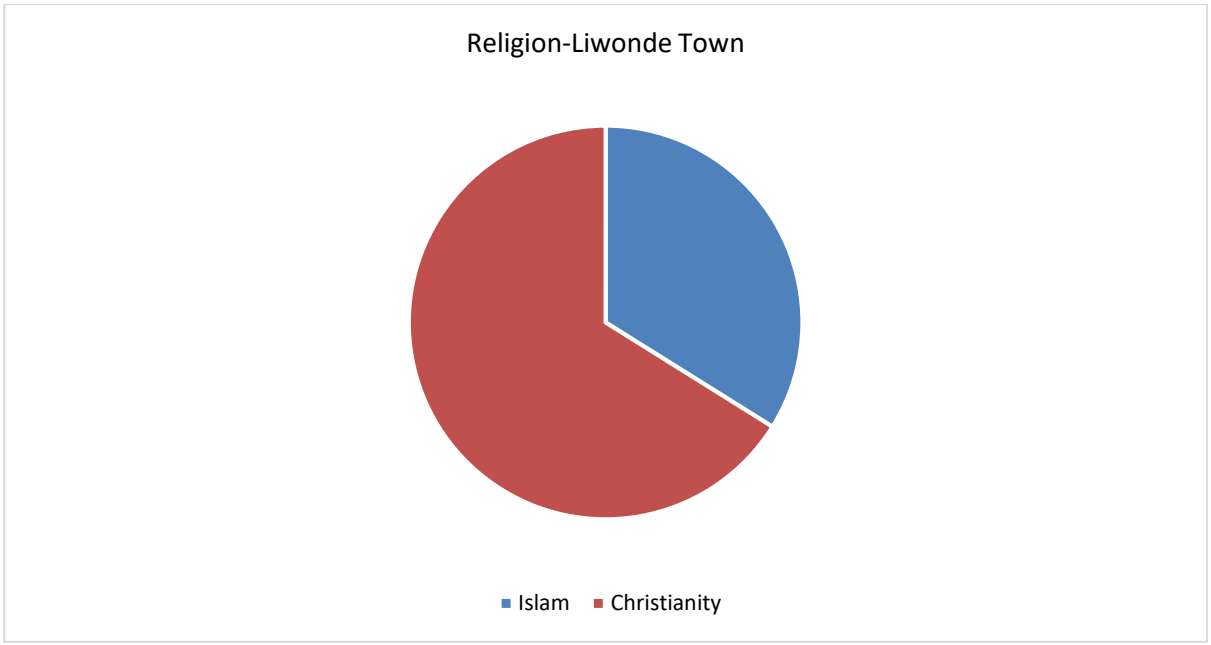

Figure 5.4: Composition of Religions (Household Survey August, 2019).

5.3.6 Livelihood and Income

Sources of income and livelihood in Balaka town includes: agriculture, formal employment, fishing activities, businesses and casual labour (Balaka District SEP 2017-2019). Agriculture being the main source of livelihood and income. However, from the household survey that was conducted during field investigations, business/trading was identified as the major source of income followed by informal employment and agriculture with 36.8%, 29.2% and 24.5% respectively. Figure 5.5 shows income sources in the project area of Balaka Town.

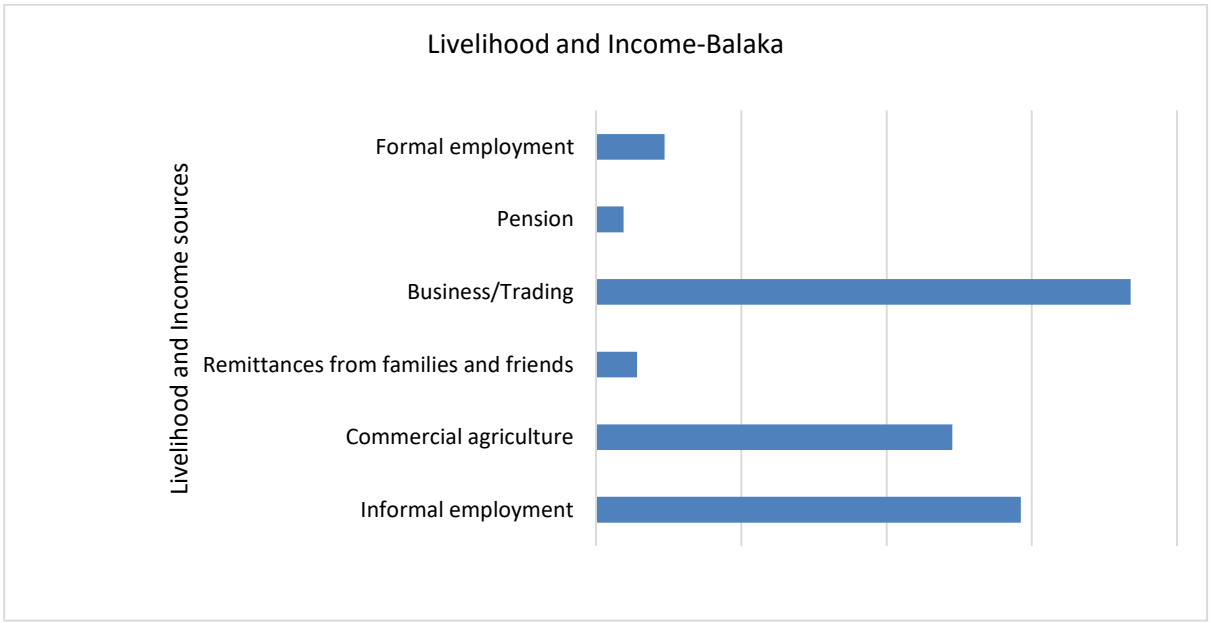

Figure 5.5: Income sources in the project area (HH survey, August 2019)

Livelihood and income sources in Liwonde town include; agriculture, fishing, businesses, casual labour (piece works), formal employment and mining. From the household survey, results show that informal employment is the major source of livelihood and income with 38.1% seconded by businesses and formal employment with 33.3% and 16.7% respectively. Figure 5.6 shows sources of livelihood and income sources for Liwonde project area.

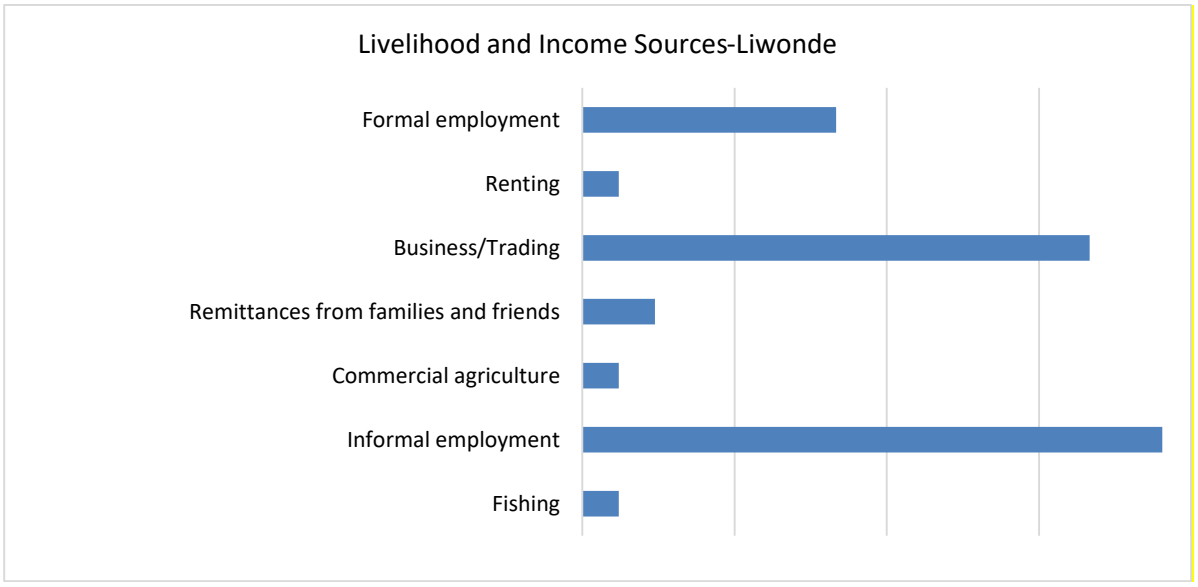

Figure 5.6: Income sources in the project area (HH survey, August 2019)

From both primary and secondary sources of income, it was noted that on average, in Balaka town, income per month was less than MK10,000 for 56.9% of the respondents, seconded by MK10,000-MK25,000 with 23.3%. Figure 5.7 shows monthly income levels for Balaka town.

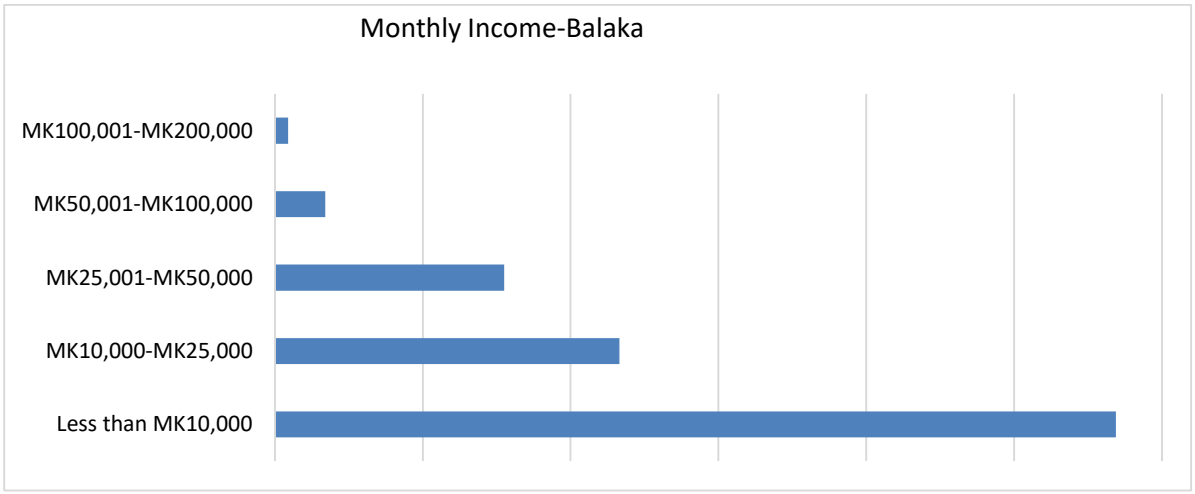

Figure 5.7: Monthly Income-Balaka (Household survey, August 2019).

On the other hand, from both primary and secondary sources of income in Liwonde, it was noted that on average, the monthly income was between MK10,000-MK25,000 for 43.9% of the respondents seconded by less than MK10,000 with 29.3%. Figure 5.8 shows monthly income levels Liwonde Town.

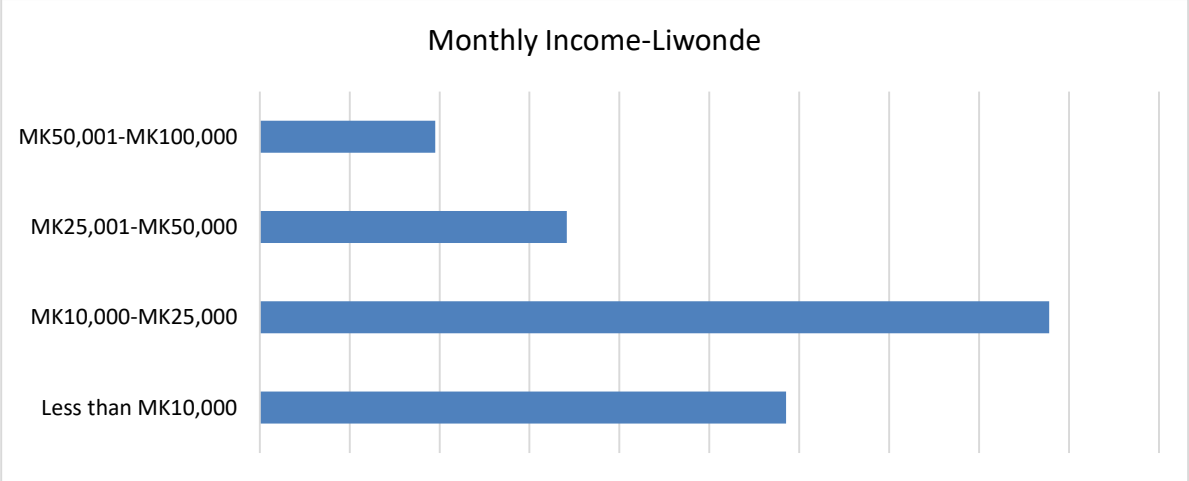

Figure 5.8: MonthIy Income-Balaka (Household survey, August 2019).

5.3.7 Education

Education and skills development is key for socio-economic development (MGDS III). Education has a strong impact on decision making in different issues including water, sanitation and hygiene issues as it helps in equipping people with knowledge.

The socio-economic survey assessed education levels of the project area. The results show that 55.5% of the sampled population attended school at primary level and 17.1% never attended school as shown in figure 5.9.

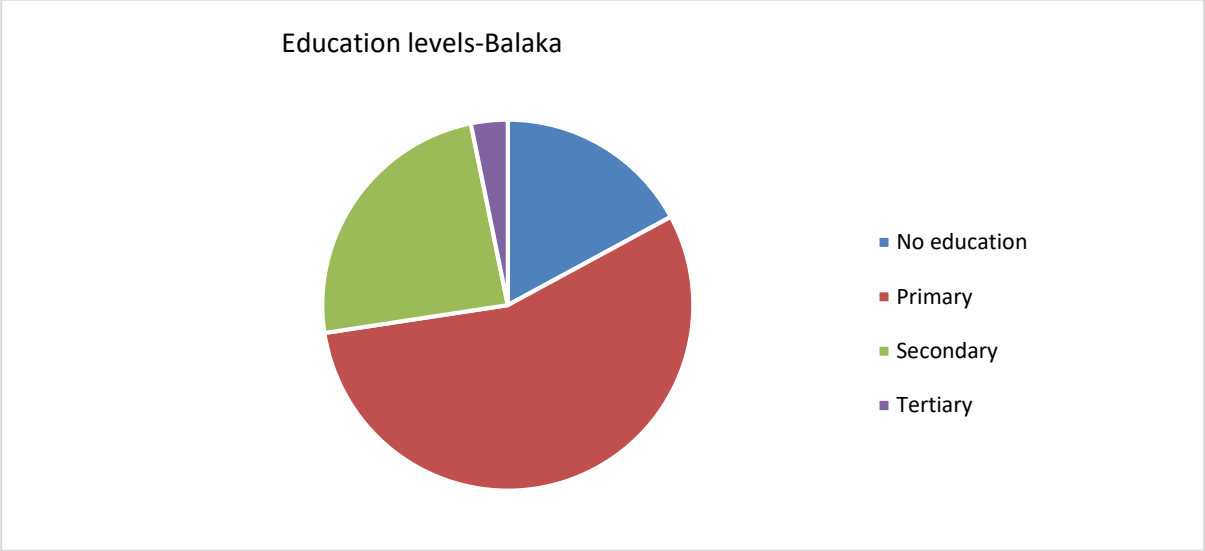

Figure 5.9: Education levels for Balaka Town (Household survey, August 2019).

Accoridng to the 2018 Population and Housing Census report, Machinga District has literacy rate of 57% while Balaka has literacy rate of 70%. High illiteracy levels in Machinga can be attributed to large number of pupils that drop out of the school system before reaching Standard 5. This could be attributed to cultural influence as most pupils at this stage go for initiation ceremonies locally known as Chinamwali. Socio-economic survey carried out in Liwonde town shows that 57% of the sampled population indicated that they attended primary level and 14.82% never attended school as shown in figure 5.10.

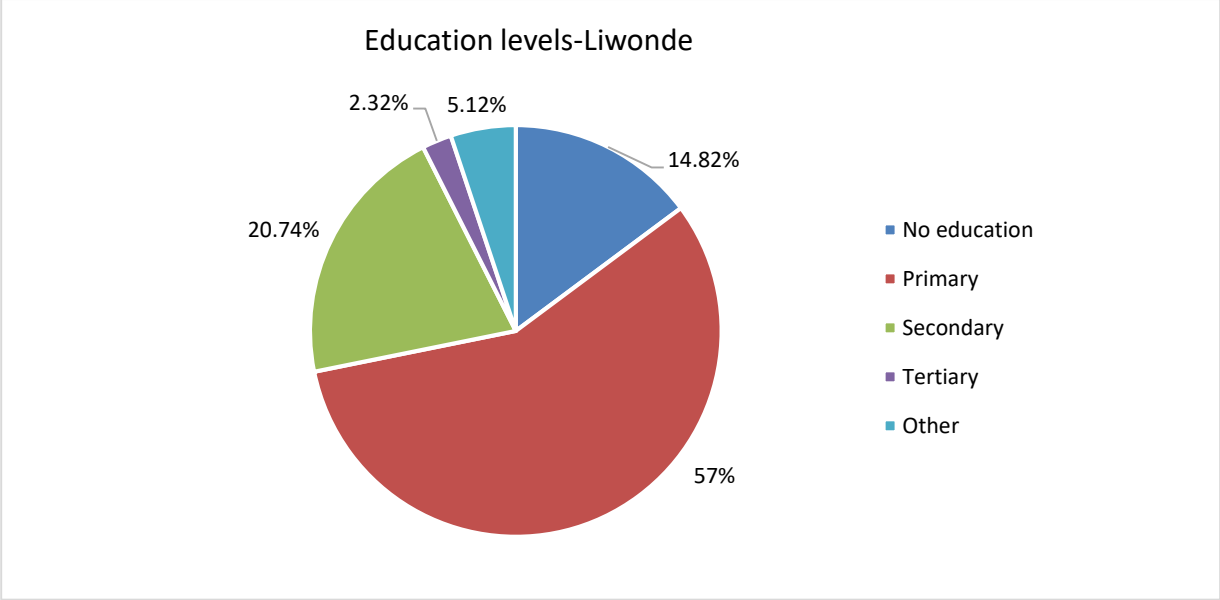

Figure 5.10: Education levels for Liwonde Town (Household Survey, August 2019).

People from along the project area (along M8 Road) access primary education from a number of schools. There are public schools as well as private schools along the route. Table 5.1 presents summarised enrolment figures for the schools along the project route. Highest enrolments are registered at Mponda, Ferry, Balaka and M'manga Primary Schools.

Pass rate in Standard 8 is highest in those schools close to big trading Centres - Balaka LEA which is in Balaka Township, Ferry FP School in Liwonde Township and Kapalamula FP School near Chingeni. Ferry Full Primary School is the only school with a Female Head teacher. It is also the one with highest pass rate and highest selection rate to secondary schools. Apart from those primary schools whose data is depicted in the table, others include Naliswe Primary School and St Paul's Catholic School.

Figure 5.11 below depicts enrolment figures for both girls and boys for the primary schools where data was provided. It is noted from the charts that in each school the enrolment figures for girls and boys are not very different, and that the majority of schools are generally experiencing a decreasing trend for both male and female students almost all the way up the classes. In a few schools such as Mponda, Balaka LEA and M'manga where there is a clear rise in the early classes followed by decreasing figures.

A general reason given for decrease in enrolment in the higher classes is that some students move to other schools to increase chances of selection to secondary schools. Some specific reasons given for some schools were as follows: Kapalamula Full Primary School, the business focus of the people around Chingeni Trading Centre makes boys not consider education as significant while at Mwanje CCAP school, boys' dropout is said to be mainly due to emigration to South Africa to look for greener pastures as this is a common practice in the Yao tribe. Another problem is drinking beer and smoking 'chamba'; this was mentioned at Sosola LEA School. Girls dropout is mainly attributed to early marriages; this was mentioned at Kapalamula, Mwanje, Sosola and Ng'onga schools.

The Balaka District SEP (2017-2022) reports that teen pregnancies, early marriages and drug abuse by the youths are issues requiring attention by the district. There is need for by-laws in the communities around the project area to encourage boys and girls to continue with education. In addition, Government plus other partners need to enhance efforts in the area that will attract pupils to consider learning seriously.

Table 5.1: Enrolment Summary for Primary Schools along the Project Area

	Name of School	Location	TA	District	Enrolment		Std 8 Pass % 2021	% of Std 8 pupils selected to Sec School	No. of teachers	
					Boys	Girls			Male	Female
1	Ferry Full Primary School	Msamati Village	Amidu	Balaka	1806	1788	97	53	8	33
2	Mmanga Full Primary School	Mmanga Village	Nsamala	Balaka	1095	1195	79	30	8	30
3	Ng'onga Primary School	Chilunga Village	Nsamala	Balaka	415	406	Data not available	19	4	8
4	Mwanje CCAP School	Mpulura Village	Nsamala	Balaka	578	533	63	8	10	28
5	Balaka L.E.A. School	Ntonya Village	Nsamala	Balaka	1226	1188	94	18	10	41
6	Mponda Full Primary School	Mponda Village	Nsamala	Balaka	1908	1918		43	13	45
7	Sosola L.E.A School	Sosola Village	Nsamala	Balaka	471	454	79	24	7	29
8	Kapalamula Full Primary School	Ndoya Village	Nsamala	Balaka	422	493	100	36	14	11

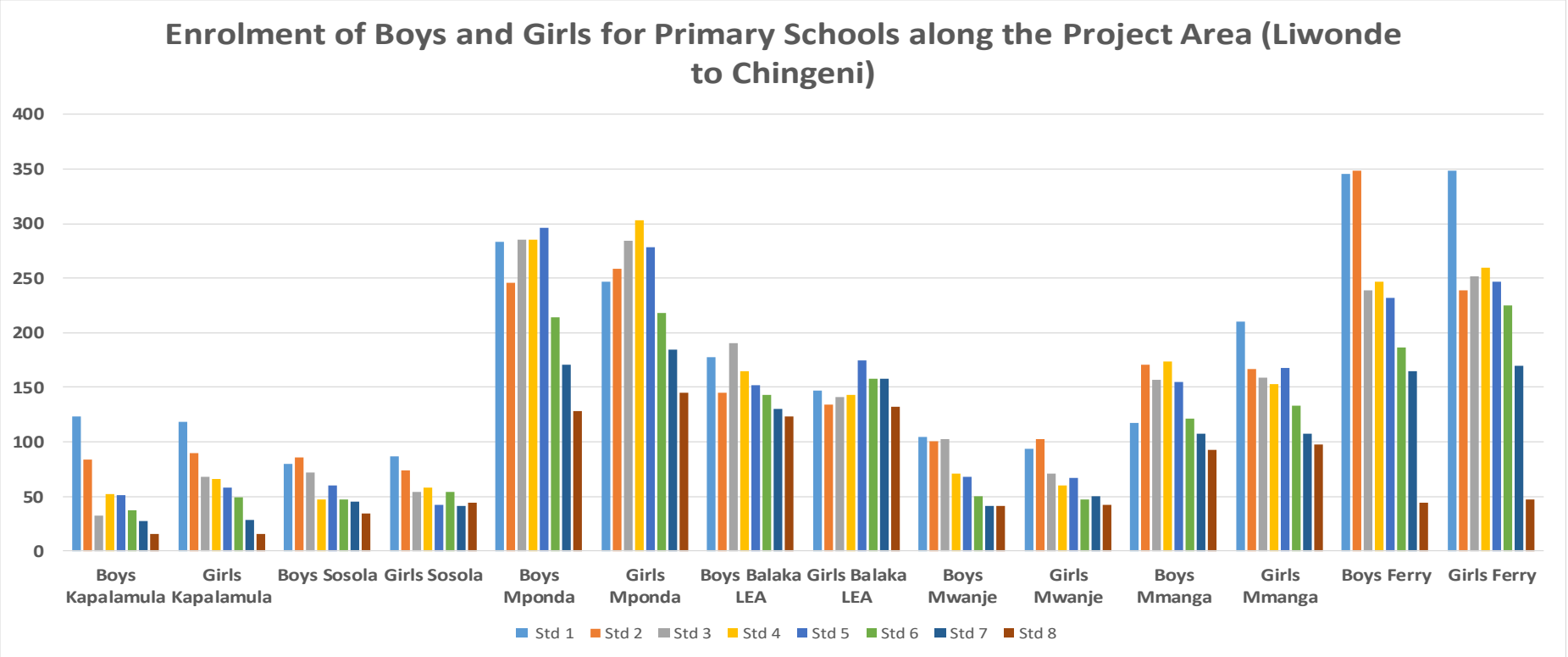

Figure 5.11: Enrolment figures for boys and Girls

5.3.8 Health situation for the project area

Public health facilities used by most people along the Liwonde-Balaka project stretch are Machinga and Balaka District Hospitals. The two health facilities are located 30 kilometres apart and choice of the facility to use mainly depends on distance to the facility.

Malaria is the leading cause of illness and morbidity in both Balaka and Machinga Districts, seconded by respiratory infections mainly in children and lastly diarrhoea (DHIS II 2015-2016). These diseases are mostly contributed by lack of information on WASH and negligence. Figures 5.12 and 5.13 show common diseases that affect people in Balaka and Liwonde towns.

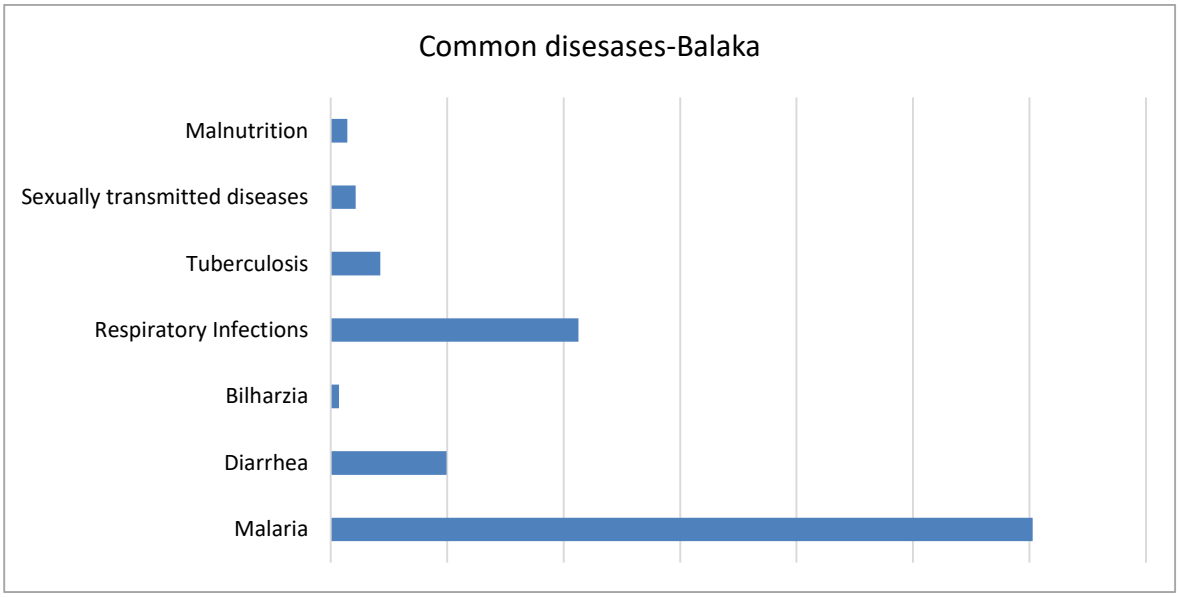

Figure 5.12: Common diseases in Balaka town (Household survey, August 2019).

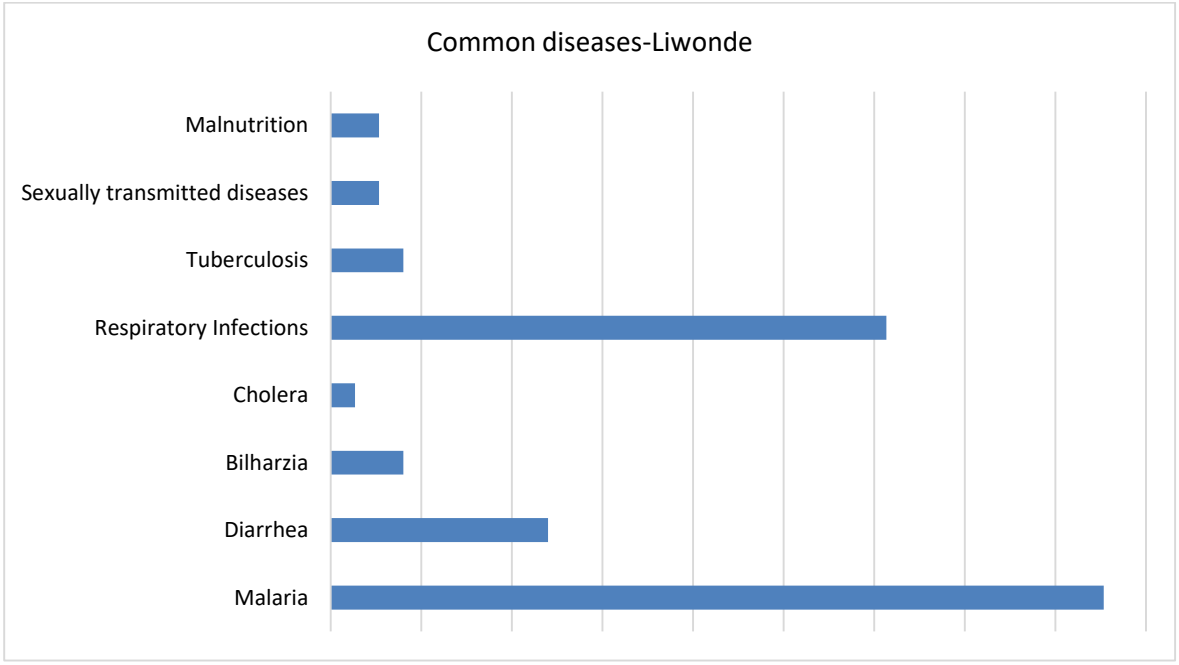

Figure 5.13: Common diseases in Liwonde town (Household survey, August 2019).

Maternal health is also a crucial issue in Machinga district. There are more maternal deaths in Machinga district as compared to other districts mainly because of early pregnancies, high fertility rates and late referrals due to lack of transport in different health facilities. High fertility rates are mainly because there is a low use of contraceptives in the district by the reproductive age group. Hence, there is a need to increase family planning awareness to those belonging to the reproductive age group, including the youth in the district.

The district councils face the following challenges in delivering quality health services to the people:

- Inadequate number of health personnel;
- Inadequate number of health facilities (health centres);
- Distances travelled to access health centres due an inadequate number of available health facilities;
- Lack of sufficient transportation in terms of ambulances at the hospitals and health centres; and
- Lack of WASH awareness and facilities such as incinerators, rubbish pits, latrines etc.

The water supply project will help in reducing some of the water related diseases such as diarrhoea. Hence, the recommendation from the health sector is that the project implementers should sensitize communities on water management, sanitation and hygiene as part of the project to ensure that positive impacts are enhanced.

5.3.9 Waste management

In Balaka and Liwonde Towns, provision of waste removal and disposal services is primarily the responsibility of Balaka and Liwonde Town Councils, respectively. Balaka Town Council runs the Sosola dump site which is located at some 4.5km south of the Balaka Town Centre. The dumpsite covering a total area of about 3ha receives both solid waste (garbage) as well as sewage and latrine sludge emptied from septic tanks and pit latrines from areas around Balaka Town.

During the study period, Balaka Town Council had two tractors which provide waste collection services to areas within the Balaka Town. Currently one of the two tractors has a fault and is not operating. In full operation, the tractors do collect waste from specific points around the town to dispose at the Sosola dump site. Specific collection points for the waste include the four main markets around the town, the district hospital, the Balaka stadium as well as at business premises like selected lodges and factories. The waste collection frequency for the Balaka District Council is daily with three or four trips carried out by the tractors per day.

To manage sewage, the Balaka District Council hires a tanker from Liwonde for emptying of full septic tanks at a fee of K30,000.00 per trip. The hiring comes in because their own tanker truck developed a mechanical problem and it is being maintained. The hired tanker which is of 1,000 litres capacity also occasionally pumps out sludge from full pit latrines, but customers are instructed to first liquefy their latrine waste with water before the emptying. The sludge removed from the septic tanks as well as latrines is transported to the disposal site at Sosola. The town of Balaka has no offsite treatment systems for sewage. All the residents rely on on-site systems which primarily include septic tanks and pit latrines. The Balaka District Hospital has an incinerator which is used in the management of medical wastes.

Liwonde Township on the other hand has an offsite sewer system, the system however is old and largely broken down. Consequently, it is not satisfying the demand for sewerage services from the growing population of Liwonde. The township has a disposal site for solid waste which is well known as a dumpsite for a variety of weeds that are harvested from the Shire River at the Kamuzu Barrage. Figures 5.14 and 5.15 show the disposed wastes at the dump sites for Liwonde and Balaka Towns.

Figure 5.14: Piles of harvested weeds from the Shire River disposed at the dumpsite for Liwonde

Figure 5.15: Garbage at the Sosola dumpsite near Balaka Town

From the conducted baseline surveys for the project area of the proposed Liwonde-Balaka water supply project, it is revealed that a majority of homes (70%) have rubbish pits where they dispose their solid waste. Some 14% of households practice indiscriminate waste disposal. Figure 5.16 summarizes the waste management practices among the households of the project area.

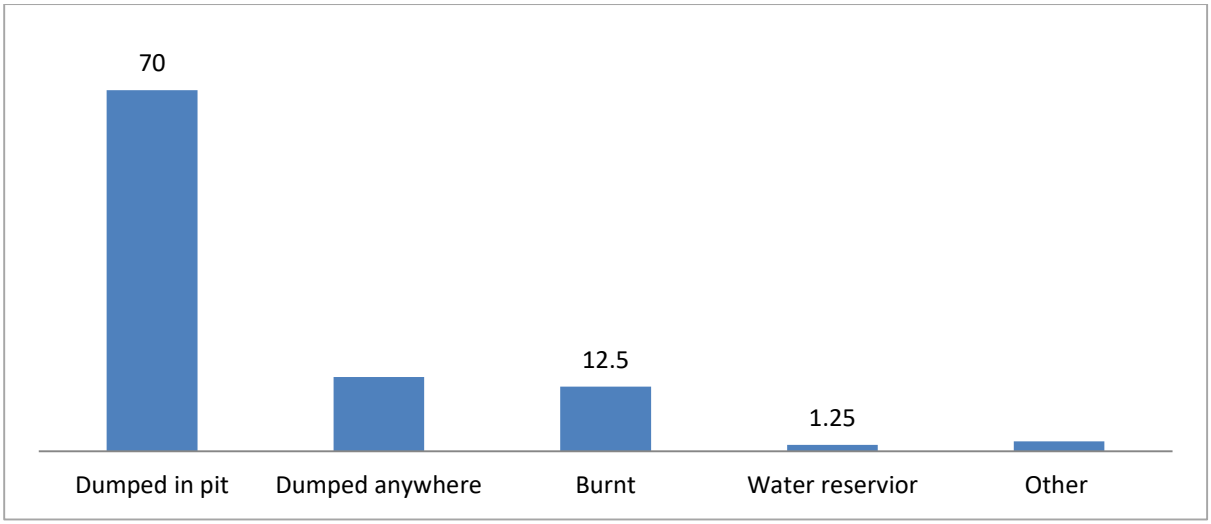

Figure 5.16: Proportion of homes (%) against methods for garbage disposal in the project area

5.3.9 Sanitation and hygiene

In the project area, from the baseline surveys it is indicated that some 91.6% of households have a toilet while 6.6% of homes do not have their own latrine facility but are sharing a latrine with their neighbours. The remaining 1.8% of families is practising open defecation. Poor condition of soils is cited by those families without a toilet as the major contributing factor for them not to dig their own pit latrines. Others indicate that low income and tradition are reasons for them not to build their own toilet.

Usage of basic pit latrines is very common in the project area (for 75.2% of households) with usage of improved toilets including improved pit latrines and flush toilets is at 24.8% of households (figure 5.17).

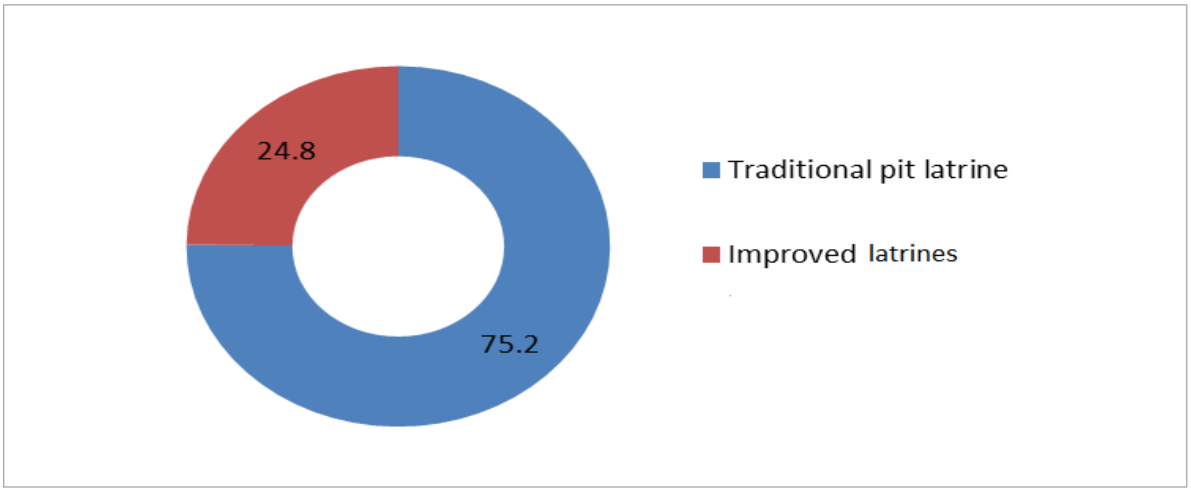

Figure 5.17: Proportion of households (%) against types of latrines used in the project area

Most households (about 59%) in the project area are well-versed with use of soap in hand washing as shown in figure 5.18.

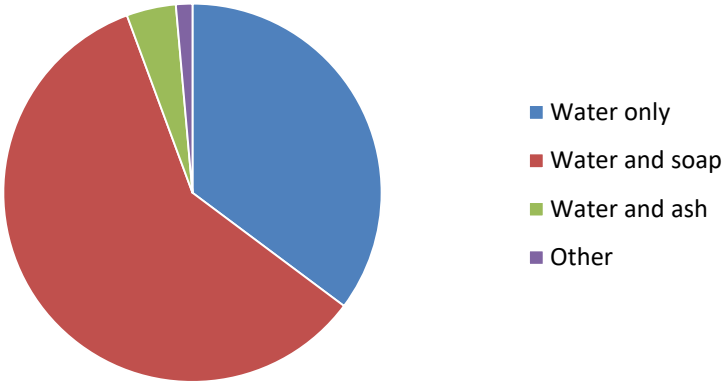

Figure 5.18: Proportion of households (%) against what they use for washing hands in the project area

Use of Rubbish pits, burning, manure making and indiscriminate disposal are ways of solid waste disposal in the project areas. Rubbish pits are very common as they are considered cheap and convenient. Though Balaka has a dedicated solid and liquid waste disposal site at Sosola, near Balaka Town, it is incomplete and not best utilized as liquid waste containment ponds were not well constructed (Figure 5.19) and maintained and as a result have never been used. Also, solid waste is not well managed; is randomly unloaded at the site and is not secured from access to locals. During WWEC's site visit, children were observed going through the waste, and playing within the site (Figures 5.21).

As for Machinga, there is a dedicated dumping site utilized for water plants that are extracted from the SRWB intake in Liwonde. The water plants are loaded on trucks and offloaded at the site. Locals near the dumping site at times request for some of the water plants to be offloaded on their properties to be used as a manure. (Figures 20).

Figure 5.19: Incomplete liquid containment ponds and unsecure waste disposal site (Sosola)

Figure 5.20: Dedicated water plant disposal site and water plant used as manure

Liquid waste is mainly disposed of through the use of drains and soak pits, indiscriminately. Most households lack knowledge on proper liquid waste disposal.

Traditional pit latrines are mostly for human waste disposal. From the household survey data, majority of the households use and own toilets. The few households that do not own toilets use their neighbour's toilets. When the latrines are full, most households fill the pits with soil and start using another latrine. Most of the families mentioned using some sort of hand washing practice, especially after using the toilet and prior to eating. Hand washing facilities were observed to be prevalent in the project areas during field investigations.

5.3.10 Access to Water

- **Water sources**

Availability of safe water is a key determinant of the socio-economic status of a community. Unsafe water usually causes water borne diseases such as diarrhoea. One determinant of accessibility is the total number of people that are using a particular water point. Water sources in Balaka town include boreholes, taps and shallow wells.

It was observed during the household survey that on average, water is accessible and is of good quality in the project area. The household survey also assessed water sources, time spent at the water source fetching for water and the distance travelled to water points.

The national standard of people accessing a water point is at a ratio of 1:250. Balaka district however, is at a ratio of 1:71, which is lower than that of the national standard. Taps are the main water source for the people in Balaka town seconded by boreholes as shown in Figure 5:21.

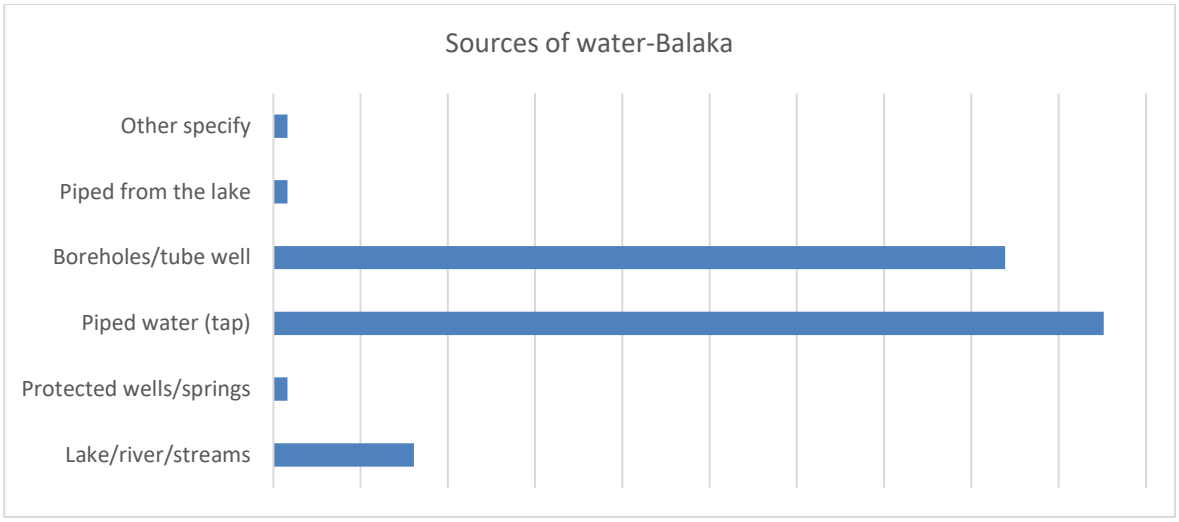

Figure 5.21: Source of water-Balaka town (Household survey, August 2019).

Water taps are the main water source for the people of Liwonde town seconded by boreholes as shown in figure 5:22.

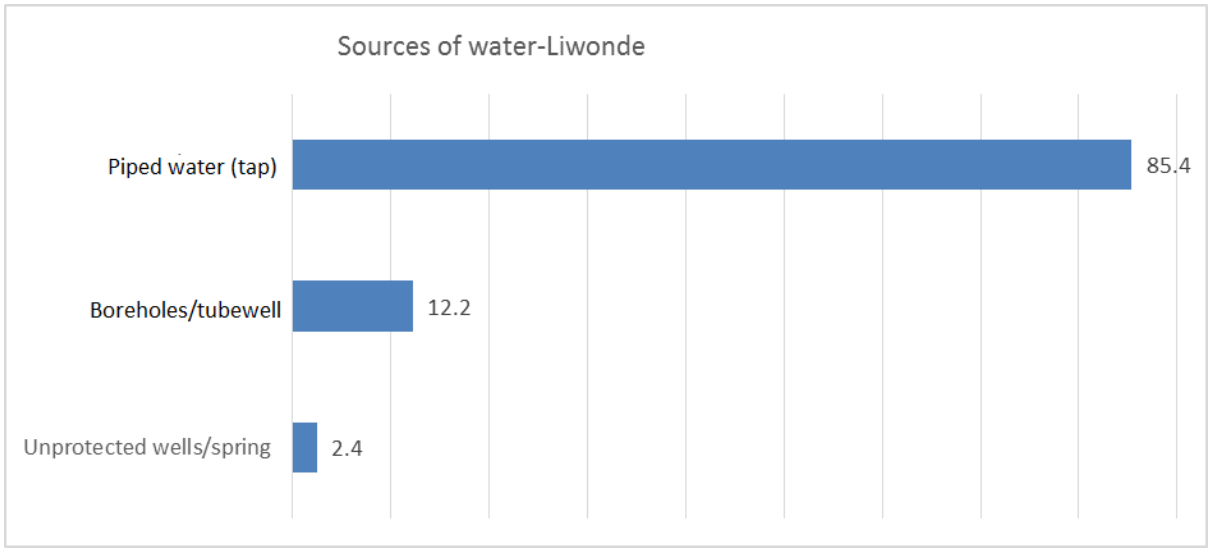

Figure 5.22: Source of water-Liwonde town (Household survey, August 2019).

- **Challenges in accessing water**

Water shortage is the major challenge that people in Balaka town face, especially in the dry season as water levels drop. Frequent breakdowns at water facilities and poor water quality due to excess calcium are major problems that people face especially those that use boreholes as a water source. Figure 5.23 shows challenges that people in the project area are facing in relation to water supply.

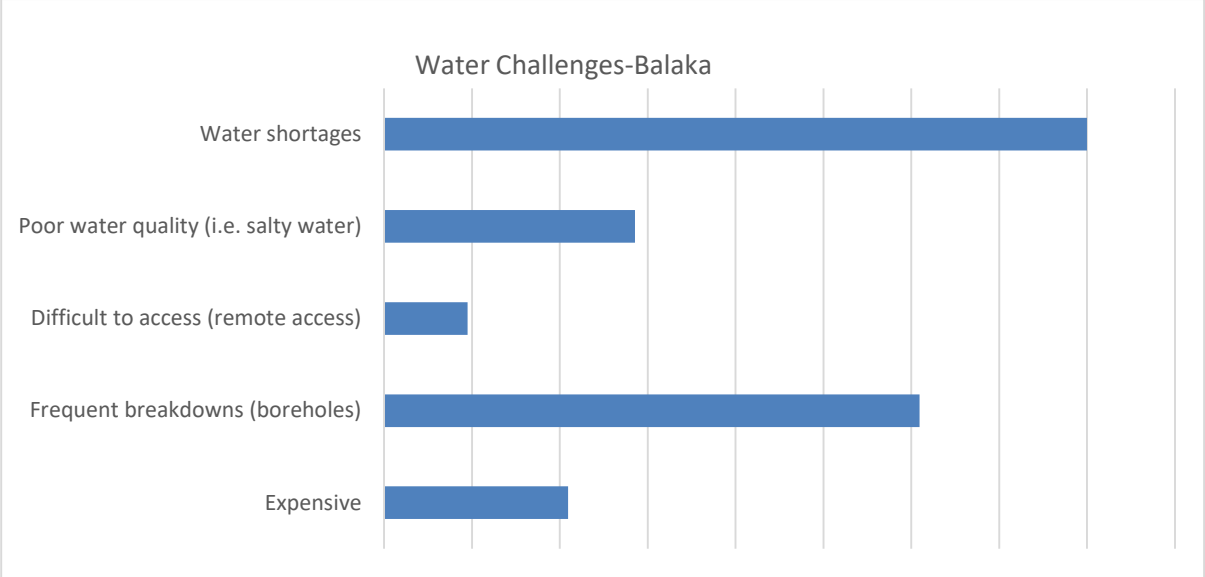

Figure 5.23: Water Supply Challenges-Balaka town

Frequent breakdown of water points (mainly communal water taps) was reported by communities as the major challenge in accessing water in Liwonde town. This is seconded by water shortages, mainly in the dry season and difficult to access water sources due to long distances to water sources as shown in figure 5.24.

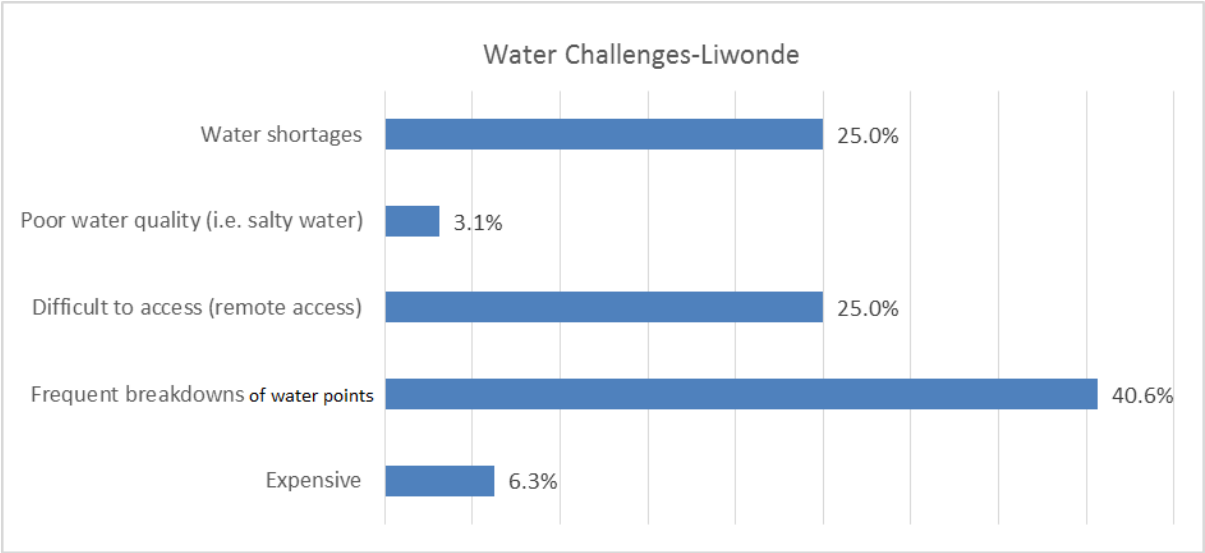

Figure 5.24: Water Supply Challenges-Liwonde town

Invasive species such as *Namasupuni* among others, also have a negative effect on water resources as they reduce the amount and quality of water in reservoirs.

- **Distance and Time taken to Access the nearest Water Source**

The government of Malawi recommends a maximum walking distance of 500m and 300m for rural and urban areas respectively. Also, the time taken to go to and from the source to fetch water should not exceed 30 minutes. Since most of the households in the project area have private piped water connections, the majority of the homes (about 66%), spend less than 15 minutes to get to and from the nearest water source. Figure 5.25 presents the times people spend to walk to a water source.

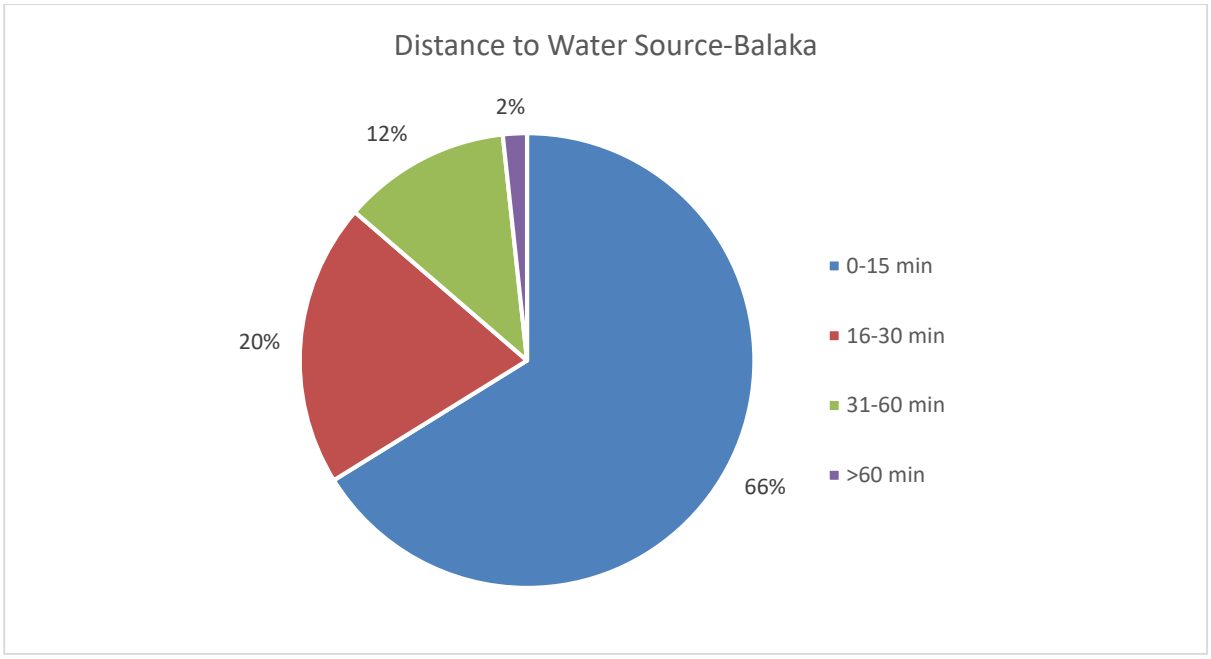

Figure 5.25: Water Source Distance from Dwelling

Although most people in Liwonde access water from boreholes, the walking distance for a round trip is within the recommended time of 30 minutes for over half of the population. Results from the household survey shows that 52% spend less than 30 minutes for a round trip, followed by those that spend more than 30 minutes at 44% as indicated in figure 5.26.

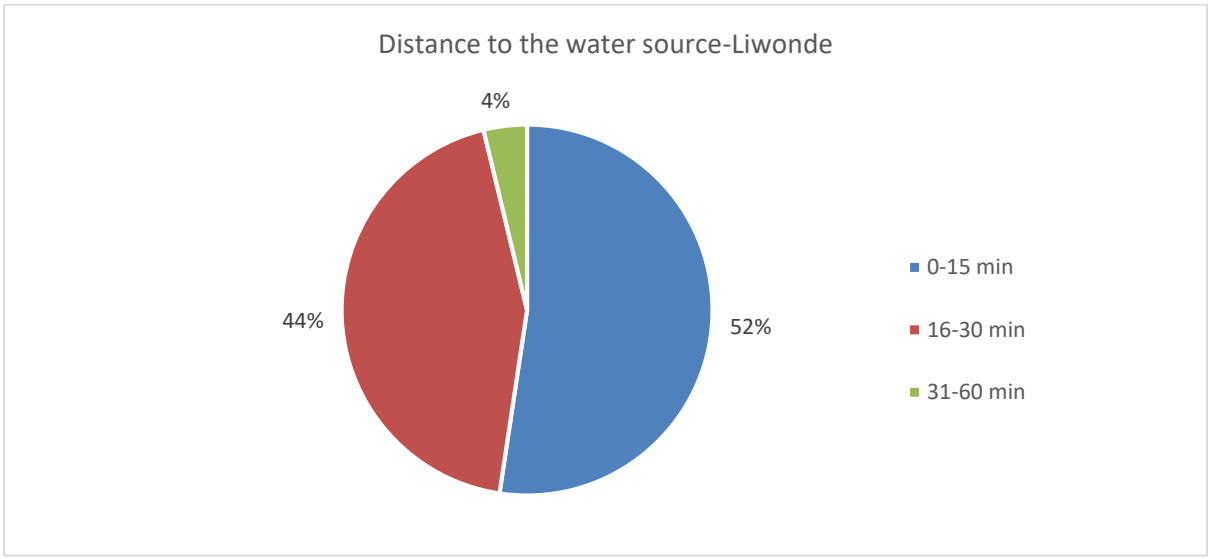

Figure 5.26: Water Source Distance from Dwelling

Since most people have private pipe water, the duration spent at water sources is minimal. From the household survey, 58% of the population spend less than 5 minutes at water sources. However, in the dry season when there are water shortages, the queueing time is prolonged, especially at boreholes as the water table lowers. Figure 5.27 shows the time spent at water sources in Balaka town.

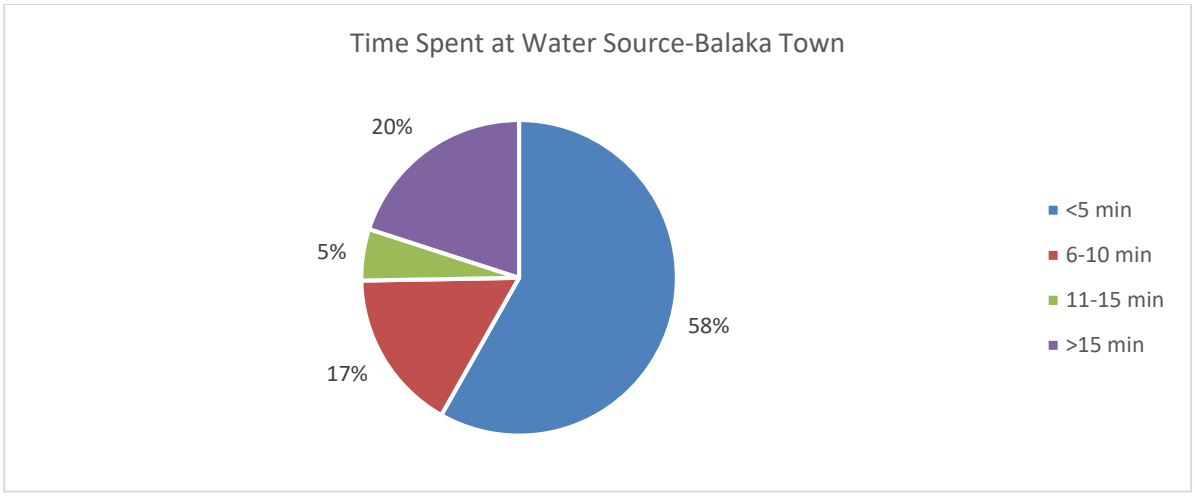

Figure 5.27: Time Spent at Water Source-Balaka Town (Household survey, August 2019).

The waiting time to access water in Liwonde Town is longer in comparison to Balaka Town. This is mainly because boreholes are the main source of water in Liwonde Town while open taps are the main water source for Balaka Town. From the household survey, it was observed that most people (35%) wait in excess of 15 minutes at the borehole and a few (8%) wait for 5 minutes or less to access water as shown in figure 5.28.

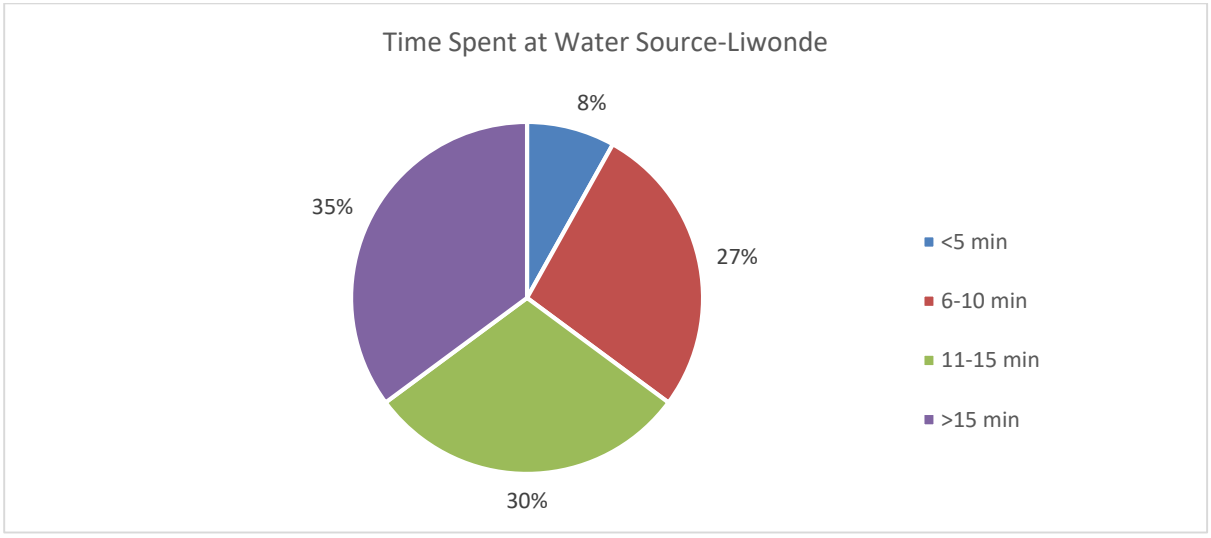

Figure 5.28: Time Spent at Water Source-Liwonde Town (Household survey, August 2019).

- **Water treatment**

Water of satisfactory quality is the fundamental indicator of health and well-being and hence crucial for the development of any country. Safety and accessibility of potable water are major concerns throughout the country and the project areas as well. Health risks are more prominent in areas where people consume unsafe water. Diarrhoea is one of the diseases that cause mortality in the project areas. As a result, there have been interventions in Malawi as a country including Balaka and Machinga districts to help in reducing water related diseases. In addition, the health sector has been taking a responsibility in making sure that people are aware of impacts of consuming unsafe water. This is done through the use of Health Surveillance Assistants (HSAs), who help in disseminating information on WASH among others including the use of safe water.

The household survey assessed measures people in the project areas take to ensure that they consume safe water. Boiling, adding chlorine (water guard) and use of covers (lids) are the major ways in which people ensure that they consume safe water as shown in Figure 5.29 and 5.30 in Balaka and Liwonde Towns respectively.

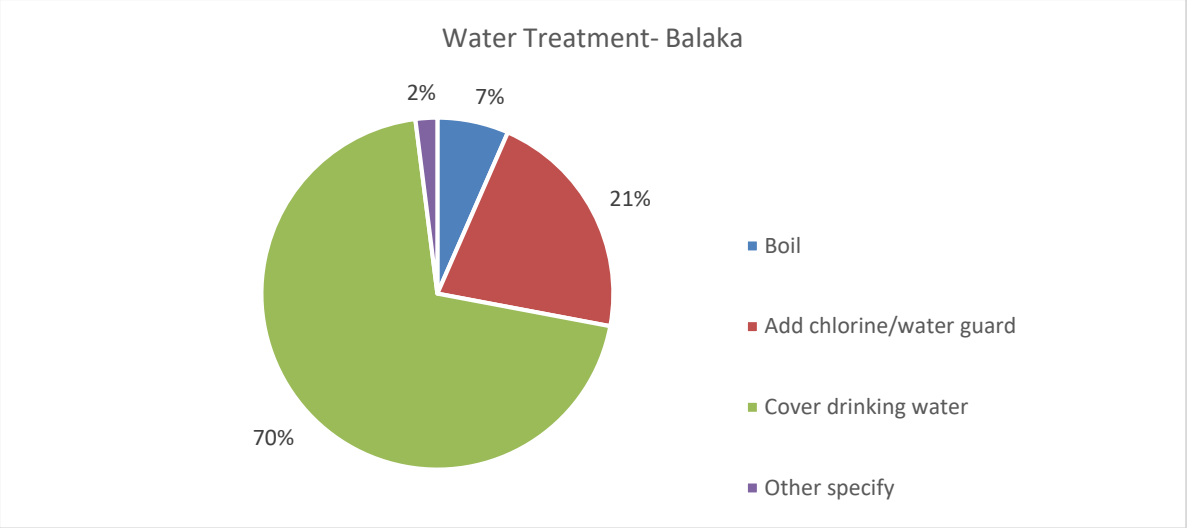

Figure 5.29: Water Treatment-Balaka (Household survey, August 2019).

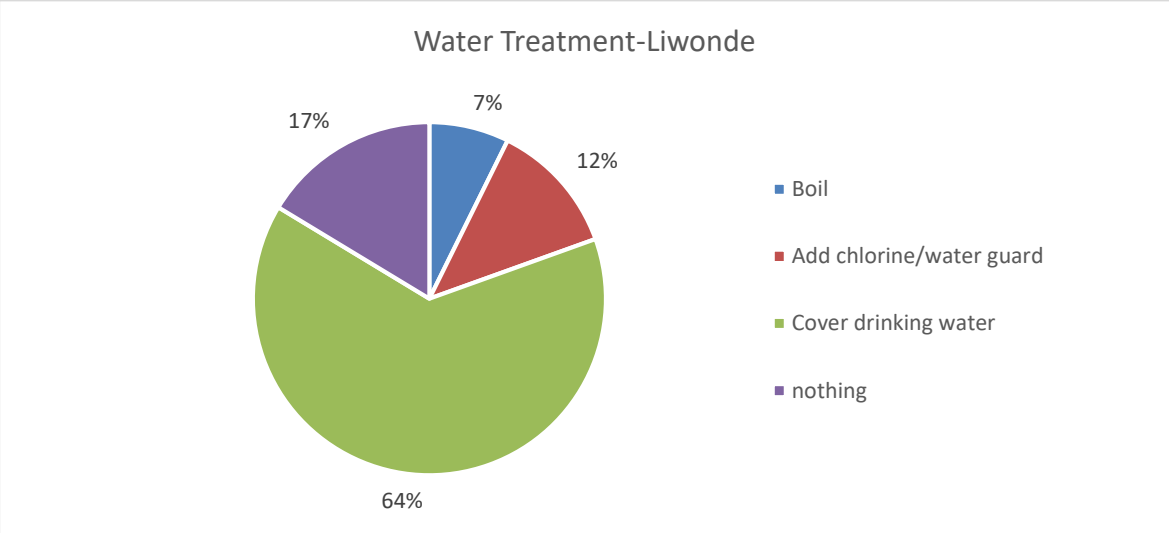

Figure 5.30: Water Treatment- Liwonde (Household survey, August 2019).

- **Willingness to pay**

The household survey also assessed the people's willingness to pay for the water supplied by the SRWB. High water prices was mentioned as one of the main challenges for people that have private taps. Those that do not have private taps were asked how much they would be willing to pay for water supplied by SRWB on a monthly basis. Based on the results in Figures 5.31 and 5.32, majority of the people in both Balaka and Liwonde fall in the range between 1MK to 2000 Mk per month. This translates to 80% of the respondents in Balaka and 67% in Liwonde Town. Minority of the people fall into the category between 8000-16,000 MK with 9% and 5% in Balaka and Liwonde towns respectively. Despite there being a concern among the people consulted regarding water prices, majority of them were in support of the project as they felt it would bring more positive than it would negative impacts.

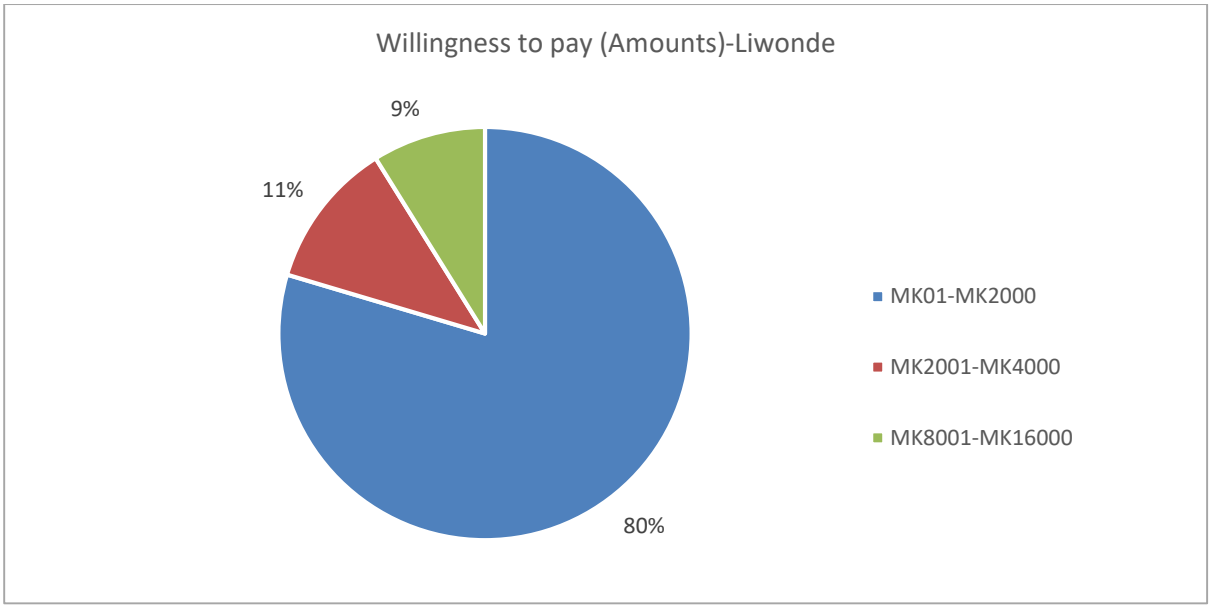

Figure 5.31: Willingness to Pay (Amounts)- Balaka town (Household survey, August 2019).

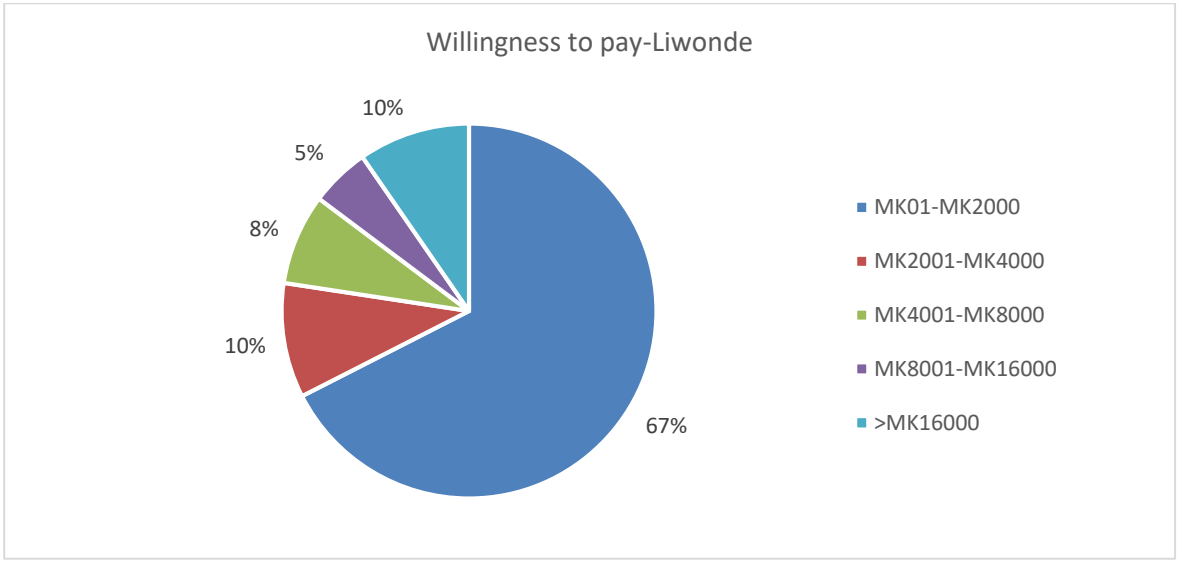

Figure 5.32: Willingness to Pay (Amounts)-Liwonde town (Household survey, August 2019).

5.3.10 Gender and sustainable development

Communities within the project area are mostly matrilineal. This has an impact on resource ownership, control, roles and responsibilities within the household. From consultations, it was observed that women participate in development activities and are able to make decisions on their own. Women also have ownership of land and sometimes have control of the use of the resources that are available at home and in their communities including land. It was also noted that men and women of the project area work together in development activities (education, water, sanitation and hygiene and nutrition). Women are responsible for household chores including fetching water and carrying out sanitation and hygiene activities in their homes and community. It was also noted during consultations that during the dry season, women spend a significant amount of time searching for water. This mostly stems from long distances travelled.

Implementation of the Balaka-Liwonde Water Supply Project will significantly reduce the burden of people having to walk long distances to fetch for water. It will also reduce the use of unsafe water in the project areas. Consequently, the women will have more productive time and will be able to contribute more to social and economic development through increased participation.

5.3.11 Degree of gender mainstreaming

Gender mainstreaming refers to the promoting of gender equality within projects and/or organisations. This results in the enabling of men and women to fully participate within the organisation and enjoy equal opportunities. The Southern Region Water Board ensures that there is equal opportunity for both men and women, and resort to affirmative action measures in line with the Malawian constitution in order to balance the female-male in the organisation.

Chapter 6: Identification and Analysis of Impacts

6.1 Introduction

Environmental and social impacts are alteration to the environmental and socio-economic baseline conditions, or a new set of adverse or beneficial environmental and social consequences, caused by the implementation of project activities. These impacts are classified as beneficial, adverse and irreversible or unavoidable impacts.

Beneficial impacts are the desired attributes of a project, which must be enhanced in order to derive as much value from them as possible. The significance of these impacts varies from one to the other and knowledge of the same is important in decision-making by SRWB and other stakeholders on prioritisation of enhancement measures for the impacts.

Sources of the impacts are all the project activities likely to induce positive or negative changes on the socio-economic environment. These sources were identified from the proposed project activities described in chapter 3.

Mitigation or enhancement measures and complementary Initiatives are measures proposed to enrich the benefits; or prevent, minimize, moderate or compensate for the adverse impacts. The costs of each mitigation and enhancement measure, where applicable, are estimated in the environmental and social management plan (Table 6.1).

The following sections present the description of the potential impacts during planning and design, construction and operation phases of the proposed rehabilitation, upgrading and expansion of Balaka - Liwonde Water Supply System.

6.2 Methodology for Impact Identification

An "environmental matrix" was used to identify the potential environmental and social impacts. Potential sources of impacts from the project activities during planning and design, construction and operation were identified with reference to the physical, biological and socio-economic components to be impacted. The impacts presented in sections 6.4 and 6.5 were determined basing on the following information:

- **Technical aspects of the project:** This enabled the identification of potential sources of impacts, based on the analysis of the technical characteristics of the infrastructures to be built, as well as the construction activities, methods and schedule. The project activities are described in detail in chapter 3.
- **Environmental and socio-economic baseline data (environmental and social components):** This information facilitated understanding of the biophysical, social and economic contexts in which the project will be implemented and identification of issues that should be considered. The environmental and social components are described in chapter 4.
- **Issues and concerns raised by stakeholders and project affected persons:** These issues, from stakeholder consultations, assisted in identification of the main concerns related to the project. Public issues and concerns are discussed in chapter 9.

6.3 Analysis of Potential Positive Impacts and their Enhancement Measures

6.3.1 Positive impacts during Planning Phase

1. **Creation of employment:** During the planning Phase of the project, SRWB will engage consultants for designing the infrastructure and conducting Environmental and Social Impact Assessment. The consultants will provide employment to people including women, youth and the vulnerable. It is estimated that during this phase of the project, about 10 professionals will be employed. Considering that this phase requires specialised individuals, the likelihood of engaging people from the surrounding area will be minimal. However, the ESIA Consultants recommends that Malawian consulting firms with required expertise should be given priority.

   Enhancement measures:
   - Give priority to Local Consulting Firms; and
   - In an even that the local consulting firms do not qualify, ensure that international firms have more than 50% of their professionals as Malawians.

6.3.2 Positive impacts during Construction Phase

1. **Creation of employment opportunities including women, the vulnerable and the youth in the area:** The project will provide employment to people including women, youth and the vulnerable from the surrounding communities and from other districts and regions of the country. It is estimated that the project will employ a minimum of 150 skilled and unskilled workers among which 40 percent will be women. It is expected that most of the unskilled labour force, during construction, will be the youth who are energetic. By employing the vulnerable during construction, this project will be of vital importance not only to mitigate the adverse impacts related to the project, but also to enhance employment inequalities. Some of the skill categories that will be required by the project will include: surveying, plumbing, carpentry, bricklaying, steel fixing, plant operation, civil engineering and driving.

   Enhancement measures:
   - Employ 80 percent of the labour force from surrounding communities;
   - Match responsibilities of the employed women, members of the vulnerable group and the youth to their abilities;
   - Include on-the-job-orientation to unskilled workers;
   - Sensitize workers with HIV and AIDS to go for medical check-ups regularly and receive HIV anti-retroviral treatment as required;
   - Provide employment to only people who are aged 18 years of age and above;
   - Workers must be treated and paid fairly for the services rendered;
   - Provide equal employment to women and men;
   - Pay local and imported labour equally for the same job;
   - Wages must be above the minimum wage and overtime must be paid on time; and
   - Provision of Terms and Conditions of Service to workers.
   - Prepare and implement Labour Management Plan (Appendix 1).

2. **Increase in trade opportunities:** The project will provide opportunities for trade due to demand for construction materials and for goods and services by contractors and workers. This will benefit the government as well in that it will increase revenue generated in the form of taxes from wages, goods and taxes.

   Enhancement measures:
   - Pay the building material suppliers within the agreed times;
   - Sourcing or buying materials from suppliers registered with MRA;
   - Support and promote of entrepreneurship skills amongst communities and business people in the project area by engaging them where appropriate;
   - Promote village savings and loan (VSL) schemes during project implementation.

3. **Skills transfer to locals that will be employed by the project:** It expected that during the construction phase of the project some local people will be employed and through the employment they are going to acquire new skills in construction sectors.

   Enhancement measures:
   - Engage over 80 percent of the labour force from surrounding communities;
   - Provide training to workers;
   - Ensure that women are given employment opportunities when engaging labourers in construction works.

4. **Source of government revenue through taxes:** Government is expected to generate revenue through taxes such as Pay-As-You-Earn (PAYE), Withholding Tax and Value Added Taxes(VAT). These taxes will be paid by the Contractor that will be engaged by SRWB.

Enhancement measures:
- Remit taxes to government through Malawi Revenue Authority (MRA), timely.

6.3.3 Positive Impacts during Operation Phase

1. **Improved water supply to Liwonde and Balaka Townships:** Currently the water supply schemes for Balaka and Liwonde produce inadequate water, such that the communities supplement with untreated water sourced from boreholes, rivers and the lake. After completion of the project, there will be a significant increase in the quantity of treated water for cooking and domestic purposes. This will improve people's lives as among other benefits.

   Enhancement measures:
   - Ensure water reservoir tanks have adequate water all the time to cover periods of no water pumping;
   - Sustain the desired performance of the water supply system through timely preventative maintenance;
   - Quickly carry maintenance works and restore water supply when there are problems;
   - Prepare and implement an intake management plan, including protection of lake Malawi, to prevent pollution;

- Regularly conduct water quality tests at the water treatment plant, in the distribution lines and in the supply points; and implement control measures where results are below safe water standards;
- Employ adequate staff and ensure that they provide appropriate work inputs through proper work schedules; and
- Sensitize the water users on proper water management practices and payment of water bills in time.

2. **Reduced time to fetch water:** The project will increase water connections in the town and extend water supply to new areas. This is expected to reduce distances women and vulnerable groups travel to draw water and the drudgery of carrying heavy buckets of water daily. In additional, the queueing time will be reduced, which in turn will lead to increase productivity time for women and girls.

   Enhancement measures:
   - Process water connection applications and provide water to the communities as quickly as possible;
   - Ensure that the recommended maximum distances of 500 metres from houses to a water point is observed when constructing communal water points;
   - Facilitate and support setting up of water kiosk management committees;
   - Ensure water is available all the time at the water points.

3. **Improved sanitation, hygiene and health:** Increased availability of treated water will result in improved sanitation and hygiene. Treated water will be available to households, public places and institutions including health centres, markets, trading centres and schools, for use in toilets and washrooms; thereby enhancing sanitation and hygiene. Improved water quality for consumption will also reduce health risks to the people including expecting mothers and infants; and this will translate into financial saving through reduced cost for medical treatment.

   Enhancement measures:
   - Sustain the desired performance of Balaka and Liwonde Water Supply schemes;
   - Conduct water quality tests at the water treatment plant, in the distribution lines and in the supply points;
   - Sensitise communities on hygienic practices for handling water to avoid secondary contamination;
   - Promote general sanitation practices amongst communities in the project area.
   - Implement the project within the planned duration

4. **Improved socio-economic welfare in Balaka and Liwonde:** Improved health of the people will result in increased productivity and consequently poverty reduction. The time saved by women and children in fetching water could be utilised in doing other income earning activities, leading to economic empowerment of the women and their families. Small-scale businesses (e.g. vegetable and food businesses including restaurants), through improved access to potable water, will be able to provide clean products and hygienic services resulting in increased sales.

   Enhancement measures:

- Provide quality water, with minimal loss of supply, through system monitoring and regular maintenance;
- Support women and other vulnerable groups to start and operate businesses through appropriate training and start-up capital;
- Make water costs affordable.

5. **Enhanced gender and women participation in development:** Women form a high percentage of the project areas' population but are inadequately participating in development activities due the burden of fetching water. Increased availability of water (including short distances to fetch water) will relieve them of these burdens, thereby availing them the opportunity to engage in development activities.

   Enhancement measures:
   - Sensitize recruiting authorities to employ about 40% to 60% women.
   - Ensure there are also women in important positions.
   - Promote the involvement of women in development activities through sensitization, advocacy and awareness.
   - Economically empower women within affected communities by linking them with the District Council's Community Service Investment Programme (COMSIP).

6. **Education benefits to the girl child:** Availability of water will remove the burden of collecting water for the girl child, leading to improved academic pursuits. Improved academic pursuit of the girl child at early stage leads to further education and competitiveness in the job market, which is an exit route from poverty.

   Enhancement measures:
   - Conduct sensitizations aimed at encouraging girls to enrol in schools.
   - Provide the necessary support and adequate resources to schools to ensure that they have adequate resources to for the provision of quality of education.
   - Provide scholarships and bursaries to deserving girls who cannot afford to pay the school fees.
   - Provide adequate water and appropriate sanitation facilities in schools to support female students.

7. **Employment opportunities:** A significant number of people will be employed to operate and maintain the pumps, water storage and service tanks and pipelines. Increased development as a result of improvement in water supply and quality will also result in increased employment opportunities.

   Enhancement measures:
   - Provide equal employment opportunities to both men and women;
   - As much as possible, provide employment opportunities to the local people, particularly women, vulnerable groups and the youth;
   - Train unskilled labour and where possible, some should be considered for employment with SRWB, especially in the areas of maintenance;
   - Given-on-the-job training and refresher courses to the water supply scheme staff;
   - Observe payment of overtime to those eligible, protect the welfare of the employees and enforce workers' safety guidelines;

- Promote village savings and loan (VSL) schemes during project implementation, to enable workers from surrounding communities save for establishing income generating activities after the project.

8. **Increase in revenue generation:** SRWB will generate additional revenue from new water connections to be provided by the project; while the Government will generate additional revenue from various forms of taxes on wages, goods and services.

   Enhancement measures:
   - Sensitize institutions and households to pay bills and on time
   - Properly manage revenue from the water supply.
   - Engage the community to identify projects which the Water Board can implement as part of cooperate social responsibility.
   - Re-invest profits in the improvement and extension of the water supply system.
   - Regularly review water tariff with consideration of the consumers to avoid overcharging them.
   - Properly manage water by replacing old pipes, repairing pipes to prevent leakages and extending intake pipes to avoid abstracting polluted water.

9. **Increased development:** Availability of running potable water improves the economic value of land and property and is one of the development pushers. Most of the investments and businesses are established in areas where there are sufficient and reliable water supply services. People will therefore settle close to sites, which will be served with piped and treated water from the project. The project will extend water supply to areas which currently do not have water supply resulting in increased business activities within these sites, thereby promoting growth of the town.

   Enhancement measures:
   - Extend water supply to potential areas for development
   - Ensure continuous and reliable water supply and adequate sanitation to the supplied areas, to attract more settlers and businesses.
   - Plan development areas in consultation with the SRWB and other service providers.

6.4 Analysis of Potential Negative Impacts

The following is a description of potential negative impacts that will be associated with the project during the Planning, Construction and Operational Phases.

6.4.1 Negative impacts during planning and designing phase

1. **Loss of land and property:** Land will be required for construction of tanks, movement of vehicles and pipes for water distribution purposes. Some of this land will be acquired from people in the area, hence some will lose agricultural land which they will need to be compensated for. The compensation process already started and now is in progress.

   Mitigation measures:
   - Prepare a Resettlement Action Plan(RAP) for the project affected persons(PAPs) where avoidance is not possible;

- Develop the Grievance Redress Mechanism(GRM) for the project and should be easily be accessible by all the affected persons.
- Minimise potential land acquisition by properly designing infrastructure and adopting a good layout plan of the infrastructure;
- Locate transmission and distribution lines within existing road reserves, as much as possible; and
- Plan and prepare all compensations in coordination with the District Commissioner and the Department of Lands.

2. **Land conflicts:** Construction works for pipelines, pump stations and service tanks may affect people's gardens, crops, trees and buildings and this may result in conflicts. The provision of piped water will also trigger demand for land, for residential and commercial infrastructure which will result in land disputes amongst family or community members.

Mitigation measures:

- Give adequate notice (one month as specified in the Water Works Act of 1995) and obtain permission from land owners before commencing the civil works.
- Avoid disturbance of gardens during growing or harvesting seasons where possible. This will require appropriate planning for project implementation to ensure that tasks are not executed when crops are in the fields.

6.4.2 Negative impacts during construction phase

1. **Land degradation:** Movement of heavy duty construction machines and equipment will result into soil compaction. Soil compaction leads to soil erosion during the rainy season and retarded vegetation growth. Cement, paints, lubricants and oils may contaminate the soil causing soil pollution. This may compromise the potential for the soils to sustain life support systems for both flora and fauna.

   Mitigation measures:

   - Ensure that vegetation is cleared and excavations are done as designed to avoid unwarranted clearance of vegetation;
   - Avoid deposits and piling up of loose soils on slopping ground or near drainage channels;
   - Rehabilitate affected land by tilling the soils to facilitate natural regeneration of vegetation;
   - Use excavated soils to rehabilitate eroded areas;
   - The routing of pipe layouts and access roads should follow areas with as little vegetation as possible;
   - Minimize the number and length of access roads and use existing roads or tracks as far as possible;
   - Provide all structures required for effective water drainage; and
   - If crossing of watercourses cannot be avoided, erect a bridge or a culvert.

2. **Change in natural scenery and landscape of the project area:** This will result due to stockpiles of solid waste during the construction period.

   Mitigation measures:

- Confine land clearing and stockpiling to the area for construction of the pipelines, access roads and water storage tanks;
- Rehabilitate affected areas by planting indigenous trees and backfilling of ruminant excavation works;
- Dispose rubble and all other waste material at licensed sites, in collaboration with the District Council;
- Store and dispose contaminated waste at appropriate designated sites approved by the District Council;
- Recycle or re-use waste materials and containers; and
- Level the trench spoil to original land contour.

3. **Risk of accidents and occupational safety hazards to workers and community members:** The implementation of the project, especially during Construction Phase, is likely going to pose some occupational safety risks to workers and surrounding communities such as falling into trenches or borrow pits including risks of accidents by moving construction vehicles.

   Mitigation measures:
   - Rehabilitate all borrow pits to be created during the upgrading, rehabilitation and expansion of the water supply systems;
   - Barricade all trenches and open pits and place clear signs to protect animals and people from falling into them;
   - Inform and sensitise the public about all open pits and trenches;
   - Compensate workers in accordance to Workers' Compensation Act of 2000;
   - Enforce speed limits for moving construction vehicles to minimise the risk of fatal accidents;
   - Conduct of risk assessment;
   - Provide workers with well stocked First Aid Box; and
   - Train workers on first aid.

4. **Creation of borrow pits:** The project will require construction materials including earth, sand and quarry stone. Extraction of these materials may lead to creation of borrow pits in the ground. In addition, excavation of trenches for laying water pipes may create borrow pits which can be hazardous to people and animals.

   Mitigation measures:
   - Source quarry stone, sand and gravel from licenced suppliers or sources;
   - Rehabilitate all borrow pits to be created during the upgrading, rehabilitation and expansion of the water supply systems;
   - Barricade all trenches and open pits and place clear signs to protect animals and people from falling into them;
   - Inform and sensitise the public about all open pits and trenches; and
   - Supervise adequately the installation of storage tanks and pipelines and follow recommended procedures.

5. **Disruption of water supply:** Water supply services may be disrupted during construction to facilitate connection of the old water supply equipment and structures to the existing facilities or vice versa.

Mitigation measures:

- Give adequate notice of potential water disruption to the water users that could be affected; and
- Provide alternative means of supplying water such as temporary by-pass piping or water bowsers where appropriate.

6. **Air quality degradation:** Dust, gas and particulate matter emission is anticipated during construction. Construction works unavoidably creates dust due to material and vehicle movement; excavation and land clearing; and construction activities. In addition, the vehicles, electricity generators and other machines, which are likely to be used during construction, result in emission of gas and particulate elements including carbon dioxide (CO_2), sulphur dioxide (SO_2), nitrogen oxides (NO_2) and various other hydrocarbons.

   Dust and particulates can present respiratory problems as well as potential allergic reactions when inhaled. Project workers, especially those that will be exposed to dust and exhaust gas emissions, may suffer from respiratory disorders. In addition, dust can cause nuisance problems when re-deposited on clothes and surfaces; and can hinder visibility. However, it is considered unlikely that ambient air quality standards will be exceeded.

   Mitigation measures:

   - Use new or fairly new vehicular equipment with exhaust gas emissions below permissible emission limits.
   - Timely and effectively maintain vehicles and equipment.
   - Apply water sprays when dust is being generated or at times of strong wind.
   - Provide protective gear (dust masks) to workers and ensure that they wear them.
   - Erect a barrier around the work sites where major construction activities are taking place to break or reduce wind and dust movement.
   - Store and handle sand and cement properly to limit dust generation.
   - Optimize transportation management to avoid needless truck drives.
   - Control vehicle speeds.
   - Reduce engine idling time.
   - Provide or facilitate regular medical check-ups for construction workers to timely treat any occupational safety illnesses and disorders related to air pollution.

7. **Loss or destruction of habitats for fauna and aquatic life:** Clearing of vegetation for construction of the access and service roads, pipelines and water storage and service tanks is likely to result in destruction of habitats for fauna. Compaction of soils may result in reduced absorption and circulation of water and air in the soil. This may eventually compromise survival of soil-based micro and macro organisms. Increased rates of soil erosion and the consequential water siltation will affect aquatic life due to depletion of oxygen and destruction of aquatic habitats and ecosystems.

   Mitigation measures:

   - Ensure that vegetation is cleared and excavations are undertaken as per designs to avoid unwarranted clearance of vegetation;
   - Rehabilitate affected land by tilling the soils to facilitate natural regeneration of vegetation; and by planting trees and grass immediately after construction works to ensure restoration of lost flora.

- Ensure that construction vehicles and plant i.e. tippers, excavators, compactors etc. use only designated access roads to avoid soils degradation outside construction areas.

8. **Loss of vegetation:** Land clearing for the construction of access roads, pipelines and water storage tanks will result in loss of vegetation and reduce biodiversity quality in the area.

   Mitigation measures:
   - Limit vegetation clearing and excavations to only those areas specified in the designs to avoid unwarranted clearance of vegetation.
   - Planting appropriate trees and grasses and grasses in all disturbed area.
   - All the trees to be cut down during construction should be costed and appropriately compensated for.
   - Ensure that for every single tree cut down, 10 tree seedlings of a similar species are planted in the adjacent areas.
   - Use cement bricks/ blocks for construction, where appropriate.
   - Train VNRMCs and other committees in catchment management and developing bye-laws and management plan agreements.
   - Rehabilitate affected land by tilling the soils to facilitate natural regeneration of vegetation; and by planting trees, including indigenous trees, and grass immediately after construction works to minimise soil erosion.
   - Sensitize employees and the community to conserve vegetation.
   - Salvage vegetation (hollow logs, seedlings, seeds, etc.) affected by the project and reuse in areas to be planted with forest woodland.

9. **Water pollution and siltation:** Construction debris, dirt, silt and soil may run into natural waterways, causing pollution and siltation. Oil spillages, from construction machinery and solid waste from construction materials and camp sites will also contribute to water pollution during the rainy season, when the spills and solid waste are washed down to the water courses.

   Mitigation measures:
   The mitigation measures for soil erosion and soil degradation also apply for this impact. In addition, the following measures are recommended:
   - Used oils should be sold to RAIPLY and ESCOM to be used for treating timber.
   - Mix cement in areas, which are not directly connected to natural drainage systems.
   - Store cement, paints, lubricants and fuels in lined and covered areas.
   - Provide appropriate spill kits when working near water courses.
   - Provide appropriate facilities for the collection of wastes on site such that they will not come into contact with water.
   - Site all material storage areas at least 10m from watercourses.
   - Provide appropriate barriers to separate worksites from water resources in order to prevent accidental spillage into water courses.

10. **Noise pollution:** Construction machinery (vehicles, excavators, compactors and concrete mixers) will generate noise that may impair the hearing of workers as well as surrounding community members.

    Mitigation measures:

- Provide noise ear plugs and tags to workers involved in noisy work environments and ensure that the PPEs are in use at all times; and
- Use light well-serviced machinery fitted with silencers.

11. **Increase in sexual relationships, unplanned pregnancies, breaking up of families and sexual harassment:** As construction workers will have extra disposable income that may be used for casual sex and some for excessive drinking; disagreements, due to the men's behaviour change, may lead to the harassment and sometimes molestation of their wives. Likewise, some women working at the project sites may harass their unemployed husbands, due to increased disposable incomes.

    Mitigation measures:
    - Use and develop Grievance Redress Mechanism (GRM);
    - Sensitise communities on the disadvantages of indulging in extra-marital affairs.
    - Conduct sensitization and awareness campaigns to encourage affected individuals to report cases of sexual harassment in the homes. Publicise places for reporting gender violence and sexual harassment.
    - Enforce punitive and disciplinary measures, including dismissal from employment, on any project workers involved in any social malpractices with surrounding communities.
    - Engage stakeholders in encouraging and empowering women to be financially independent.
    - Create a good work environment to allow female workers report any case of harassment.
    - Develop and implement Code of Conduct for workers.

12. **Risk of increased school dropouts amongst the youth:** School girls and teenagers will be exposed to sexual abuse in return for money. This may lead to pregnancies and increased school dropouts in the area.

    Mitigation measures:
    - Sensitise communities and girls in particular on the dangers of getting involved in pre-marital sex at a tender age.
    - Enforce punitive and disciplinary measures, including dismissal from employment, on any project workers involved in illicit sex with school going girls.
    - Engage the district project managed by the social welfare and community development offices to assist pupils going back to school.

13. **Risk of increase in spread of HIV and AIDS** due to extra disposable income to the workers and business persons. This may attract sex workers into the area and may contribute to increased STIs and HIV and AIDS rates;

    Mitigation measures:
    - Development and implementation HIV and AIDS workplace policy;
    - Sensitise workers and surrounding communities on the dangers of indulging in unprotected sex.
    - Conduct HIV and AIDS sensitization and give lighter tasks to those with the virus or other health problems.
    - Provide both male and female condoms to workers for appropriate use.

14. **Unequal employment:** During informal consultations, it was observed that most of the project activities in the construction phase are considered to be 'strength-requiring-jobs' and hence "men's" jobs; for example, digging trenches and laying pipes. As such, the project will tend to employ more men than women. In additional, according to the culture of the area, usually men take key positions while women take supportive roles. Similarly, at national level, there are more men in the construction industry than women. As such, women may take more supportive roles (for example cooking and ferrying water).

    Mitigation measures:
    - Encourage the contractor to employ women as well. A clause should be included in the contract specifying that at least 30% of the employees should be women.
    - Conduct gender meetings to sensitize and encourage women and to instil confidence that they can also do the work that men do.
    - Ensure there are also women in important positions such as foremen and engineers.
    - Economically empower women within affected communities by linking them with the District Council's Community Service Investment Programme (COMSIP).
    - Create a good work environment to allow female workers report any case of harassment.

15. **Risk of Child labour:** There is a potential risk that the contractor may employ people aged less than 18 years during the construction phase of the project.

    Mitigation Measures
    - Employ people aged 18 and above; and
    - Sensitise community members on the dangers of child labour.

16. **Risk of increased incidences of COVID-19 Transmission**

There is likely to be an influx of people from various places to the project impact area seeking employment. Interactions between different people from different areas is likely going to increase the likelihood of contracting COVID-19.

Mitigation measures:
- Provide workers with handwashing facilities including hand sanitisers;
- Promote and enforce the wearing of face masks;
- Ensure that workers are provided adequate working space;

6.4.3 Negative impacts during demobilization phase

1. **Loss of jobs and businesses:** Local labourers will be laid off during the demobilization phase. This will result in loss of livelihoods. Because of job losses, businesses that were thriving or had opened (mainly food and alcohol businesses) because of the project staff will also be affected negatively. This may in turn, also lead to loss of jobs where employees were running the businesses.

    Mitigation Measures
    - Provide all workers (including those in construction) on pension in line with Pension's Act of 2011;
    - Provide alternative employment to employees e.g. as maintenance staff;

- Provide adequate notice to employees to prepare themselves and secure alternative employment;
- Pay severance benefits to leaving workers in line with the labour regulations;
- Sensitize the workers and the general community to be saving; and
- Sensitize the business persons to diversify and find alternative markets.

2. **Abandonment of excavated areas for raw materials:** There is potential for abandonment of borrow pits after the construction works, in particular at the treatment, water reservoir and on sites where construction materials will be sourced. The impact is not anticipated in the pipeline route, as it will be a requirement to bury the pipe after laying it in the trenches. Borrow pits are an issue as they can be a death trap to wildlife and children. In addition, borrow pits create unsightly conditions and they can be breeding grounds for mosquitoes; borrow pits can change the ecosystem.

   Recommended Mitigation Measures
   - Fill up and close pits after the construction works;
   - Rehabilitate all work site;
   - Construction materials e.g. sand and clay soils should be sourced from licensed suppliers; and
   - Avoid making deep pits during the construction period.

6.4.4 Negative impacts during operational phase

1. **Increase in solid waste generation:** During the operation phase, mainly at the treatment plant and offices, there will be an increased generation of solid waste (e.g. plastic, wrappings and containers), paper, office wastes including printing cartridges, kitchen (canteen) wastes etc. This waste can be a nuisance if not properly disposed.

   Mitigation measures:
   - Metal waste should be recycled and/ or sold to tinsmiths or vendors for reuse or re-sale.
   - Provide solid waste storage bins and skips.
   - Monitor skips so that they do not become overfilled.
   - Ensure that collected solid waste is disposed of in an approved disposal sites.
   - Implement sensitization campaigns on consequences of indiscriminate waste disposal

2. **Increased pollution from wastewater and sludge:** The water treatment activities will generate wastewater and sludge as by-products, which if not properly managed can pollute water and affect people's health, aquatic life and the natural habitat. Wastewater and sludge produce odours, can be breeding grounds for insects; and where they infiltrate into the ground, they can pollute groundwater. It was learnt, from the stakeholder consultations that poor sanitation in the project areas is caused largely by lack of civic education about WASH and also due to non-existence of Village Sanitation Committees (VSCs)

   The increase in water consumption (by all types of consumers) due to the expansion of the water supply scheme will result in increased wastewater generation by the consumers. This will lead to surface and groundwater pollution. Increase in wastewater will manifest itself as sullage at communal water points, bath shelters and septic tank soakaways. This wastewater must be properly managed to avoid pollution.

Mitigation measures:

- Enforce proper excreta and wastewater management especially in the town.
- Apply lime treatment to dewatered sludge to suppress pathogens and remove odour.
- Use licensed liquid waste handlers.
- Dry sludge on drying beds before disposing off in a dedicated disposal site.
- Prepare and enforce operational guidelines for sludge treatment and management.
- Conduct WASH activities to sensitize people on the benefits (including prevention of cholera) of good the hygiene.

3. **Increased risk of water contamination:** Risk of water contamination will increase with the additional water supply infrastructure. Water contamination may occur along the transmission and distribution pipelines especially where pipes have been broken and where they are close to malfunctioning human waste disposal facilities such as excreta disposal pipes, septic tanks and soakaway pits; and waste disposal sites producing leachate.

   Mitigation measures:

   - Mend broken water pipes as quickly as possible;
   - Follow recommended guidelines for distances that must be maintained between liquid waste disposal facilities and water pipes; and
   - Move the water intake pipe as far into the lake as possible.

4. **Increased risk of fire from the electrical systems and from bush fires:** Additional electrical wiring and pumps at the treatment plant and booster stations may pose additional risks of electrical fires if not well installed and regularly maintained.

   Mitigation measures:

   - Ensure appropriate and approved electrical installations and equipment;
   - Design and implement an emergency response plan;
   - Train staff in firefighting and regularly conduct fire drills;
   - Install fire hydrants within the proposed development;
   - Regularly monitor and maintain the electrical systems;
   - Install a fire extinguisher at the plant and train workers on how use;
   - Prohibit smoking in places which can easily catch fire and sensitise people on the dangers of fire incidences;
   - Prepare and maintain fire breaks.

5. **Increased incidences of pipe bursts in the high-pressure pipes:** Increased potential of failure in pipes and water storage tanks may result in flooding of water and damaging people's property or crops.

   Mitigation measures:

   - Use the right sized pipes;
   - Replace old pipes with new ones.

6. **Increased chances of theft and vandalism due to increased size of infrastructure:** The high unemployment rates due to rapid population growth and a small economic base contribute to increased criminal activity in Malawi. Cases of vandalism and theft of water supply equipment are reported in the project area. Vandalism and theft may lead to water

leakages and flooding, where a large pipe is vandalised. The leakages may result in inadequate supplies in the households, hence reduced sanitation, health and hygiene. Flooding, on the other hand, may damage property and result in accidents. Vandalism and theft also would have an impact on the revenue and maintenance cost of water supply system.

Mitigation measures:

- Periodically conduct consultations and sensitizations with villages and group village heads and security personnel;
- Provide security at the intake, treatment plant and water reservoir sites;
- Support activities of the neighbourhood watch (community policing) e.g. through provision of torches, uniforms and shoes;
- Support economic activities in the area as part of corporate social responsibilities;
- Reward for reports of vandalism and theft that may lead to capture;
- Theft and vandalism cases must be reported to the police;
- Regularly monitor the pipeline infrastructure; and
- Include the people from the local area in the work force.

6.5 Significance Rating of The Impacts

The significance of the identified potential environmental and social impacts has been determined by assessing the consequence and the probability of occurrence of the impact as follows:

Significance of the impact = ***consequence x probability***

where:

Consequence = ***severity*** + ***reversibility*** + ***duration*** + ***spatial extent*** + ***environmental context***

The factors are defined as follows:

1. **Severity/ Magnitude:** measures the general degree, extensiveness, or scale of impact. It is defined in terms of the observable impact on a resource in the context of the project locality and wider ecosystem or social domain.
2. **Reversibility:** refers to the ability of the site or the impact receptor to recover after an impact has occurred.
3. **Duration:** this is the period of time over which an impact may occur; from a once-off occurrence to continuous, during the life of the Project. This aspect considers the time that is estimated for an affected population or resource to return to "baseline" conditions. Duration is calculated from the time an impact begins to when it ceases. Frequency: considers the number of times an impact is expected to occur over the duration of a proposed project.
4. **Environmental context:** considers the sensitivity of the receptor upon which the impact is occurring.
5. **Areal extent:** refers to the size of the impact area.
6. **The probability:** the likelihood of the impact occurring.

The above factors are ranked using the criteria indicated in Table 6.1 below.

Table 6.1: Criteria for Ranking Factors for Consequences and Probability

Severity/ Magnitude	Reversibility	Duration/ frequency	Areal extent	Environmental context	Probability
5 – Very high/ don't know	5 – Irreversible	5 – Permanent and/or continuous impact	5 - International	5 – highly sensitive or very rare environmental component	5 – Definite / don't know
4 – High		4 – Long term (impact ceases after operational life) and/or very frequent impact	4 – National	4 – sensitive or rare environmental component	4 – High probability
3 – Moderate	3 - Recoverable (needs human input)	3 – Medium term (2 – 7 years) and/or frequent impact	3 – Regional	3 – moderately sensitive or uncommon environmental component	3 – Medium probability
2 – Low		2 – Short term (0 – 2 years) and/or infrequent impact	2 – Local	2 – non-sensitive or common environmental component	2 – Low probability
1 – Minor	1 – Reversible (regenerates naturally)	1 – Immediate and/or unique impact	1 – Site only	1 – non-sensitive and widely dispersed environmental component	1 – Improbable
0 - None					0 - None

Expert judgement is used when assigning the values for the factors. The maximum value that can be obtained for the significance of the impact is 125 points. The impacts are rated as of Very High, High, Moderate, Low or Very Low significance as shown in Table 6.2 following.

Table 6.2: Significance Rating of the Impacts

SIGNIFICANCE RATING FOR POSITIVE IMPACTS		
More than 100	Impact is of the highest order possible.	Very High
Between 76 and 100	Impact is substantial.	High
Between 51 and 75	Impact is real but not substantial in relation to other impacts.	Moderate
Between 26 and 50	Impact is of low order.	Low
25 or less	Impact is negligible.	Very Low
SIGNIFICANCE RATING FOR NEGATIVE IMPACTS		
Value	**Description**	**Significance**
More than 100	Impact is of the highest order possible. Mitigation is required to lower impacts to acceptable levels. Potential fatal flaw.	Very High
Between 76 and 100	Impact is substantial. Mitigation is required to lower impacts to acceptable levels.	High
Between 51 and 75	The impact is real but not substantial in relation to other impacts. Mitigation should be implemented to reduce impact.	Moderate
Between 26 and 50	Impact is substantial. Mitigation is required to lower impacts to acceptable level.	Low
25 or less	Impact is negligible. No mitigation is required.	Very Low

6.6 Impact Significance Rating for the Identified Impacts

The potential environmental and social impacts were assessed and the significance ratings before the mitigation measures are applied are as presented in Table 6.3.

Table 6.3: Impact significance rating before the mitigation measures are applied

ID	Potential Environmental and Social impacts	Severity	Reversibility	Duration	Areal Extent	Environmental Context	Probability	Total	Significance without mitigation/ enhancement	Significance with mitigation/ enhancement
1.	POSITIVE IMPACTS									
1.1.	**Construction Phase**									
1.1.1.	Creation of employment opportunities including for women, youth and vulnerable people	4	3	2	2	4	4	60	Moderate	Very High
1.1.2.	Increase in trade opportunities	3	3	2	2	4	3	42	Low	High
1.1.3.	Revenue generation for Local Government	3	3	2	2	4	3	42	Low	High
1.2.	**Operation and Maintenance Phase**									
1.2.1.	Improved water quality and quantity	5	3	4	2	4	5	90	High	Very High
1.2.2.	Reduced distance to draw water	5	5	4	2	4	4	80	High	Very High
1.2.3.	Improved sanitation, hygiene and health	4	3	4	2	4	4	68	Moderate	High
1.2.4.	Improved socio-economic welfare in Liwonde and Balaka	4	3	4	2	4	4	68	Moderate	High
1.2.5.	Enhanced gender and participation in development	4	3	4	2	4	3	51	Moderate	High
1.2.6.	Education benefits to girl child	3	3	4	2	4	3	48	Low	High
1.2.7.	Employment opportunities	2	3	4	2	4	3	45	Low	High
1.2.8.	Increased revenue generation for the water board	3	3	4	2	3	4	60	Moderate	High
1.2.9.	Increased development	4	3	4	2	3	3	48	Low	High
2.	NEGATIVE IMPACTS									
2.1.	**Planning**									
A.	Loss or destruction of land and/ or property	2	3	5	2	3	4	60	Moderate	Low
B.	Land conflicts	2	3	1	2	4	4	48	Low	Very low
2.2.	**Construction Phase**									
2.2.1.	Land degradation	4	3	2	1	3	4	52	Moderate	Very low
2.2.2.	Change in natural scenery and landscape of the project area due to stockpiles of solid waste	3	3	2	1	3	3	36	Low	Very low
2.2.3.	Accidents and hazards from trenches and borrow pits	3	3	2	1	4	3	39	Low	Very low
2.2.4.	Disruption of water supply	4	3	1	1	4	4	52	Moderate	Very low
2.2.5.	Water pollution and siltation	2	3	2	2	4	3	39	Low	Very low
2.2.6.	Air quality degradation/ increase respiratory disorders	2	1	1	1	4	3	27	Low	Very low
2.2.7.	Loss or destruction of habitats for fauna and aquatic life	4	1	2	1	3	4	44	Low	Very low
2.2.8.	Loss of vegetation	4	3	2	1	3	4	52	Moderate	Very low
2.2.9.	Occupational incidents and accidents	3	3	1	1	4	3	36	Low	Very low
2.2.10.	Noise pollution	3	1	1	1	4	3	30	Low	Very low
2.2.11.	Increase in sexual relationships, unplanned pregnancies breaking up of families and sexual harassment	4	3	4	2	4	4	68	Moderate	Very low
2.2.12.	Risk of increase in spread of HIV and AIDS	4	5	4	2	4	4	76	High	Low
2.2.13.	Unequal employment	3	3	2	2	4	3	42	Low	Very low
2.2.14.	Increased risk of COVID-19 Transmission	3	3	2	1	4	3	39	Low	Very low
2.3.	**Demobilisation Phase**									

ID	Potential Environmental and Social impacts	Severity	Reversibility	Duration	Areal Extent	Environmental Context	Probability	Total	Significance without mitigation/ enhancement	Significance with mitigation/ enhancement
2.3.1	Loss of jobs and businesses	3	5	5	2	3	4	72	Moderate	
2.3.2	Abandonment of borrow pits	3	2	3	2	3	3	39	Low	
2.4.	**Operation Phase**									
2.4.1.	Increased pollution from wastewater and sludge	3	3	4	1	4	3	45	Low	Very low
2.4.2.	Increased risk of water contamination	2	3	1	1	4	3	33	Low	Very low
2.4.3.	Increased risk of fire from the electrical systems	2	3	1	1	4	3	33	Low	Very low
2.4.4.	Increased incidences of pipe bursts in the high-pressure pipes	3	3	1	1	4	3	36	Low	Very low

From the assessment of the impacts summarized in Table 6.3 above, on overall, the anticipated adverse impacts are assessed as Moderate and can be mitigated to Very Low. The most severe impact of the project is expected to be of "increase in prevalence of sexually transmitted infections (STIs), including HIV/ AIDS". The SRWB, in collaboration with other stakeholders, must provide regular awareness and community sensitization campaigns on dangers of promiscuous sexual relationships and HIV and AIDS. Overall the project has more beneficial impacts than adverse impacts.

Chapter 7: Environmental and Social Management and Monitoring Plans

7.1 Environmental and Social Management Plan

This Environmental and Social Management Plan (ESMP) has been prepared to facilitate the integration of the enhancement and mitigation measures in the implementation of this project. The aim of the ESMP is to ensure that SRWB will prevent, reduce, mitigate, and compensate for the impacts of the proposed project on the biophysical and socio-economic environment. The ESMP, presented in Table 7.1 contains the following:

- Potential Positive and Negative environmental and social impacts of the project;
- Enhancement measures for the Positive impacts and the mitigation measures for the Negative impacts;
- Responsible institutions to implement the mitigation measures;
- Estimated cost for implementing the measures; and
- Time frames for implementation of the mitigation measures.

Southern Region Water Board and the Contractor have the responsibility of ensuring that the ESMP is implemented effectively and fully.

Table 7. 1: Environmental and Social Management Plan for the Project

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
1.	**POSITIVE IMPACTS**				
1.	**Planning Phase**				
1.1.1	Creation of Employment	• Give priority to Local Consulting Firms; and • In an even that the local consulting firms do not qualify, ensure that international firms have more than 50% of their professionals as Malawians.	During Planning phase	SRWB	No Cost
1.2	**Construction phase**				
1.2.1	Creation of employment opportunities including women, the vulnerable and the youth in the area	• Employ 80 percent of the labour force from surrounding communities; • Match responsibilities of the employed women, members of the vulnerable group and the youth to their abilities; • Include on-the-job-orientation to unskilled workers; • Sensitize workers with HIV and AIDS to go for medical check-ups regularly and receive HIV anti-retroviral treatment as required; • Provide employment to only people who are aged 18 years of age and above; • Workers must be treated and paid fairly for the services rendered;	Continuously throughout construction	Contractor, District Social Welfare Officer, District Labour Officer & Consultants	2,000,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
		• Provide equal employment to women and men; • Pay local and imported labour equally for the same job; • Wages must be above the minimum wage and overtime must be paid on time; • Provision of Terms and Conditions of Service to workers; and • Prepare and implement Labour Management Plan (Appendix 1).			
1.2.2	Increase in trade opportunities	• Pay building material suppliers within the agreed times; • Source materials from suppliers registered with MRA; • Sensitize workers to save and invest; • Support and promote entrepreneurship skills amongst communities and business people in the project area; • Promote village savings and loan (VSL) schemes during project implementation.	Quarterly	District Social Welfare Officer/ Contractor	800,000
1.2.3	Skills transfer to locals that will be employed by the project	• Engage over 80 percent of the labour force from surrounding communities; • Provide training to workers; • Ensure that women are given employment opportunities when engaging labourers in construction works.	Quarterly	District Labour Office	No Cost

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
1.2.4	Source of government revenue through taxes	• Remit taxes to government through Malawi Revenue Authority (MRA), timely			No Cost
1.3	**Operation Phase**				
1.3.1	Improved water quantity and quality	• Ensure water reservoir tanks have adequate water all the time to cover periods of no water pumping • Sustain the desired performance of the water supply system through timely maintenance • Quickly carry maintenance works and restore water supply when there are problems • Prepare and implement an intake management plan. • Regularly conduct water quality tests at the water treatment plant, in the distribution lines and in the supply points and implement control measures where results are below safe water standards. • Employ adequate staff and ensure that they provide appropriate work inputs through proper work schedules • Sensitize the water users on proper water management practices and payments of water bills in time.	Throughout the operation period	SRWB	To be covered within the operation and maintenance budget for the scheme

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
1.3.2	Reduced time to fetch water	• Process water connection applications and provide water to the communities as quickly as possible • Ensure that the recommended maximum distances of 500 metres from houses to a water point/kiosk is observed when constructing communal water points • Facilitate and support setting up of water kiosk management committees • Ensure water is available all the time at the water points	Throughout the operation period	SRWB	1,800,000
1.3.3	Improved sanitation, hygiene and health	• Sustain the desired performance of Balaka - Liwonde Water Supply System; • Conduct water quality tests at the water treatment plant, in the distribution lines and in the supply points; • Sensitise communities on hygienic practices for handling water to avoid secondary contamination; • Promote general sanitation practices amongst communities in the project area; • Implement the project within the planned duration	Monthly for water quality analysis and quarterly for sensitization	SRWB District Water Officer, District Environmental Health Officer NGOs	2,000,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
1.3.4	Improved socio-economic welfare in Balaka and Liwonde	• Provide quality water, with minimal loss of supply, through system monitoring and regular maintenance • Support women and other vulnerable groups to start and operate business through appropriate training and start-up capital • Make water costs affordable	Throughout the operation period	SRWB NGO	N/A (Within the operation and maintenance budget of the board)
1.3.5	Enhanced gender and women participation in development	• Sensitize recruiting authorities to employ about 40% to 60% women. • Ensure there are also women in important positions. • Promote the involvement of women in development activities through sensitization, advocacy, and awareness. • Economically empower women within affected communities by linking them with District Councils Community Service Investment Programme (COMSIP)	Yearly	District Social Welfare Officer, District Gender Officer	2,000,000
1.3.6	Education benefits to girl child	• Conduct sensitizations aimed at encouraging girls to enrol in schools. • Provide the necessary support and adequate resources to schools to ensure that they have adequate resources to ensure the provision of quality of education.	Yearly for girl sensitizations	SRWB, District Education Manager.	2,000,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
		• Provide scholarships and bursaries to deserving girls who cannot afford to pay the school fees.			
1.3.7	Employment opportunities	• Provide equal employment opportunities to both men and women • Provide employment opportunities to the local people, particularly women, vulnerable groups and the youth • Train unskilled and where possible, some should be considered for employment with SRWB, especially in the areas of maintenance • Give-on-the-job training and refresher courses to the water supply scheme staff. • Observe payment for overtime, protection of the welfare of the employees and workers' safety guidelines • Promote village savings and loan (VSL) schemes during project implementation, to enable workers from surrounding communities save for establishing other income generating activities after the project.	Continuously throughout operation phase	SRWB	N/A (Within the operation and maintenance budget of the board)
1.3.8	Increased revenue generation for SRWB	• Sensitize institutions and households to pay bills on time • Properly manage revenue from the water supply.	Continuously throughout operation phase	SRWB	N/A (Within the operation and maintenance budget of the board)

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
		• Engage the community to identify projects which the Water Board can implement as part of cooperate social responsibility. • Re-invest profits in the improvement and extension of the water supply system. • Regularly review water supply tariff with consideration of the consumers to avoid overcharging them. • Properly manage water by replacing old pipes, repairing pipes to prevent leakages and extending intake pipes to avoid abstracting polluted water.			
1.3.9	Increased development	• Extend water supply to potential areas for development • Ensure continuous and reliable water supply and adequate sanitation to the supplied areas, to attract more settlers and businesses. • Plan development areas in consultation with the RWB and other service providers.	Continuously throughout operation phase	SRWB	N/A (Within the operation and maintenance budget of the board)
2.	**NEGATIVE IMPACTS**				
2.1.	**Planning and designing phase**				
2.1.1	Loss or destruction of land and/ or property	• Emphasis should be on minimising and avoiding any potential land acquisition costs when selecting the	Before the construction starts	SRWB, District Lands Officer	TBD for land compensations

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
		sites for the tanks and routes for the pipelines • Where avoidance is not possible, identify affected households and compensate them for loss of land and other property in consultation with the Department of Lands, the local leaders and the District Council • Locate transmission and distribution lines within existing road reserves, as much as possible. • Plan and prepare all compensations in coordination with the Balaka and Machinga District Commissioners and the Department of Lands.			
2.1.2	Land conflicts	• Give adequate notice (one month as specified in the Water Works Act of 1995) and obtain permission from land owners before commencing the civil works. • Where possible, the contractor should avoid disturbance of gardens during growing or harvesting seasons. This will require appropriate planning for project implementation to ensure that tasks are not executed when crops are in the fields.	Before construction starts	Contractor, SRWB, District Lands Officer	N/A
2.2.	**Construction phase**				
2.2.1	Land degradation	• Ensure that vegetation is cleared and excavations are done as designed to	Throughout construction	Contractor	5,000,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
		avoid unwarranted clearance of vegetation. • Avoid deposits and piling up of loose soils on slopping ground or near drainage channels. • Rehabilitate affected land by tilling the soils to facilitate natural regeneration of vegetation. • Use excavated soils to rehabilitate eroded areas. • The routing of pipe layouts and access roads should follow areas with as little vegetation as possible. • Minimize the number and length of access roads and use existing roads or tracks as far as possible. • Provide all structures required for effective water drainage. • If crossing of watercourses cannot be avoided, erect a bridge or a culvert			
2.2.2	Change in natural scenery and landscape of the project area due to stockpiles of solid waste	• Confine land clearing and stockpiling to the area for construction of the pipelines, access roads and water storage tanks; • Rehabilitate affected areas by planting indigenous trees and backfilling of ruminant excavation works; • Dispose rubble and all other waste material at licensed sites, in	Throughout construction	SRWB & District Forestry Officer	5,000,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
		collaboration with Balaka and Machinga District Councils; • Store and dispose contaminated waste at appropriate designated sites approved by Balaka and Machinga District Councils; • Recycle or re-use waste materials and containers • Level the trench spoil to original land contour.			
2.2.3	Risk of accidents and occupational safety hazards to workers and community members:	• Rehabilitate all borrow pits to be created during the upgrading, rehabilitation and expansion of the water supply systems; • Barricade all trenches and open pits and place clear signs to protect animals and people from falling into them; • Inform and sensitise the public about all open pits and trenches; • Compensate workers in accordance to Workers' Compensation Act of 2000; • Enforce speed limits for moving construction vehicles to minimise the risk of fatal accidents. • Conduct of risk assessment; • Provide workers with well stocked First Aid Box; and • Train workers on first aid.	Throughout construction	SRWB/ Contractor	5,000,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
2.2.3	Creation of borrow pits	• Source quarry stone, sand and gravel from licenced suppliers or sources; • Rehabilitate all borrow pits to be created during the upgrading, rehabilitation and expansion of the water supply systems; • Barricade all trenches and open pits and place clear signs to protect animals and people from falling into them; • Inform and sensitise the public about all open pits and trenches; and • Supervise adequately the installation of storage tanks and pipelines and follow recommended procedures.	During Construction Phase	Contractor	2,000,000
2.2.4	Disruption of water supply	• Give adequate notice of potential water disruption to the water users that could be affected. • Provide alternative means of supplying water such as temporary by-pass piping or water bowsers where appropriate	Throughout construction	SRWB	N/A (Within the operation and maintenance budget of the board)
2.2.5	Water pollution and siltation	• Obtain licences to abstract water and discharge wastewater from the water authority • Sell used oils to Raiply and ESCOM to be used for treating timber.	Throughout construction	Contractor and Consultants	10,000,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
		• Mix cement in areas, which are not directly connected to natural drainage systems. • Store cement, paints, lubricants, and fuels in lined and covered areas. • Provide appropriate spill kits when working near water courses. • Provide appropriate facilities for the collection of wastes on site such that they will not come into contact with water. • Site all material storage areas at least 10m from watercourses. • Provide appropriate barriers to separate worksites from water resources in order to prevent accidental spillage into water courses.			
2.2.6	Air quality degradation	• Use new or fairly new vehicular equipment with exhaust gas emissions below permissible emission limits. • Timely and effectively maintain vehicles and equipment. • Apply water sprays when dust is being generated or at times of strong wind. • Provide protective gear (dust masks) to workers and ensure that they wear them.	Throughout construction	Contractor and Consultants	2,000, 000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
		• Erect a barrier around the work sites where major construction activities are taking place to break or reduce wind and dust movement. • Store and handle sand and cement properly to limit dust generation. • Optimize transportation management to avoid needless truck drives. • Control vehicle speeds. • Reduce engine idling time. • Provide or facilitate regular medical check-ups for construction workers to timely treat any occupational safety illnesses and disorders related to air pollution.			
2.2.7	Loss or destruction of habitats for fauna and aquatic life	• Ensure that vegetation is cleared and excavations are undertaken as per designs to avoid unwarranted clearance of vegetation; • Rehabilitate affected land by tilling the soils to facilitate natural regeneration of vegetation; and by planting trees and grass immediately after construction works to ensure restoration of lost flora. • Ensure that construction vehicles and plant i.e. tippers, excavators, compactors etc. use only designated access roads to avoid soils	Throughout construction	Contractor and Consultants	5,000,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
		degradation outside construction areas.			
2.2.8	Loss of vegetation	• Limit vegetation clearing and excavations to only those areas specified in the designs to avoid unwarranted clearance of vegetation. • Plant appropriate trees and grasses in all disturbed areas. • All the trees to be cut down during construction should be costed and appropriately compensated for. • Ensure that for every single tree to be cut down, 10 tree seedlings of a similar species should be planted in the adjacent areas. • Use cement bricks/ blocks for construction, where appropriate. • Train VNRMCs and other committees in catchment management and developing bye-laws and management plan agreements. • Rehabilitate affected land by tilling the soils to facilitate natural regeneration of vegetation; and by planting trees, including indigenous trees, and grass immediately after construction works to minimise soil erosion. • Sensitize employees and the community to conserve vegetation.	Throughout construction (land preparation)	Contractor SRWB	10,000,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
		• Salvage vegetation (hollow logs, seedlings, seeds, etc.) affected by the project and reuse in areas to be planted with forest woodland.			
2.2.9	Occupational incidents and accidents	• Induct workers on OSH requirements and repeat reminders on the same. • Employ an OSH expert to monitor and ensure that appropriate equipment and acceptable codes of practice for various tasks are followed by workers at all times. • Provide appropriate personal protective equipment (PPEs) to construction workers; and ensure that it is used at all times.	Throughout construction	Contractor and Consultants	10,000,000
2.2.10	Noise pollution	• Provision of noise ear plugs/tags to workers that will be involved in noisy work environments and to ensure that the PPEs are in use at all times; • Use light well-serviced machinery fitted with silencers.	Throughout the construction period	Contractor and Consultants	Cost Covered above on purchase of PPE
2.2.11	Increase in sexual relationships, unplanned pregnancies breaking up of families and sexual harassment.	• Use and develop Grievance Redress Mechanism (GRM); • Sensitise communities on the disadvantages of indulging in extra-marital affairs. • Conduct sensitization and awareness campaigns to encourage affected individuals to report cases of sexual	Quarterly	Contractor and Consultants	2,000,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
		harassment in the homes. Publicise places for reporting gender violence and sexual harassment. • Enforce punitive and disciplinary measures, including dismissal from employment, on any project workers involved in any social malpractices with surrounding communities; • Engage stakeholders in encouraging and empowering women to be financially independent. • Create a good work environment to allow female workers report any case of harassment. • Develop and implement Code of Conduct for workers.			
2.2.12	Risk of increased school dropouts amongst the youth	• Sensitise communities and girls in particular on the dangers of getting involved in pre-marital sex at a tender age. • Enforce punitive and disciplinary measures, including dismissal from employment, on any project workers involved in illicit sex with school going girls. • Engage the district project managed by the social welfare and community development offices to assist pupils going back to school.	Quarterly	SRWB Contractor	2,000,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
2.2.13	Risk of increase in spread of HIV and AIDS	• Sensitise workers and surrounding communities on the dangers of indulging in unprotected sex. • Conduct HIV and AIDS sensitization and give lighter tasks to those with the virus or other health problems. • Provide both male and female condoms to workers for appropriate use.	Quarterly	Contractor SRWB	5,000,000
2.2.14	Unequal employment	• Encourage the contractor to employ women as well. A clause should be included in the contract specifying that at least 30% of the employees should be women. • Conduct gender meetings to sensitize and encourage women and to instil confidence that they can also do the work that men do. • Ensure there are also women in important positions such as foremen and engineers. • Economically empower women within affected communities by linking them with the District Council's Community Service Investment Programme (COMSIP). • Create a good work environment to allow female workers report any case of harassment.	Yearly	Contractor District Social Welfare Officer	2,000,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
2.2.15	Increased risk of COVID-19 Transmission	• Provide workers with handwashing facilities including hand sanitisers; • Promote and enforce the wearing of face masks; • Ensure that workers are provided adequate working space;	Throughout Constriction Period	Contractor	5,000,000
2.3	**Demobilisation Phase**				
2.3.1	Loss of jobs and businesses	• Provide all workers (including those in construction) on pension in line with Pension's Act of 2011; • Provide alternative employment to employees e.g. as maintenance staff; • Provide adequate notice to employees to prepare themselves and secure alternative employment; • Pay severance benefits to leaving workers in line with the labour regulations; • Sensitize the workers and the general community to be saving; and • Sensitize the business persons to diversify and find alternative markets.	After construction	Contractor and Consultants	2,000 ,000
2.3.2	Abandonment of excavated areas for raw materials	• Fill up and close pits after the construction works; • Rehabilitate all work site; • Construction materials e.g. sand and clay soils should be sourced from licensed suppliers; and	After construction	Contractor and Consultants	5,000,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
		• Avoid making deep pits during the construction period.			
2.4	**Operation Phase**				
2.4.1	Increase in solid waste generation	• Sell or recycle metal waste to tinsmiths or vendors for reuse or re-sale; • Provide solid waste storage bins and skips; • Monitor skips so that they do not become overfilled; and • Ensure that collected solid waste is disposed of in an approved disposal sites.	Quarterly	SRWB	2,000,000
2.4.2	Increased pollution from wastewater and sludge	• Enforce proper excreta and wastewater management especially in the town. • Apply lime treatment to dewatered sludge to suppress pathogens and remove odour. • Use licensed liquid waste handlers • Dry sludge on drying beds before disposing off in a dedicated disposal site. • Prepare and enforce operational guidelines for sludge treatment and management. • Conduct WASH activities to sensitize people on the benefits (including	Twice a year	SRWB Environmental Health Officer	2,000,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
		prevention of cholera) of good the hygiene.			
2.4.3	Increased risk of water contamination	• Mend broken water pipes as quickly as possible; • Follow recommended guidelines for distances that must be maintained between liquid waste disposal facilities and water pipes; and • Move the water intake pipe as far into the lake as possible.	Monthly	SRWB	N/A (Within the operation and maintenance budget of the board)
2.4.4	Increased risk of fire from the electrical systems	• Ensure appropriate and approved electrical installations and equipment; • Design and implement an emergency response plan. • Train staff in firefighting and regularly conduct fire drills • Install fire hydrants within the proposed development. • Regularly monitor and maintain the water supply system. • Install a fire extinguisher at the plant and train workers on how use.	Throughout operation phase	SRWB	2,000,000
2.4.5	Increased incidences of pipe bursts in the high-pressure pipes	• Use the right sized pipes; • Replace old pipes with new ones.	Throughout operation phase	SRWB	N/A (Within the operation and maintenance budget of the board)
2.4.6	Increased chances of theft and vandalism	• Periodically conduct consultations and sensitizations with villages and group village heads and security personnel.	Through the operation period	SRWB	5,000 ,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Schedule for implementation	Responsible institution	Implementation cost/year (MK)
	due to increased size of infrastructure	• Provide security at the intake, treatment plant and water reservoir sites. • Support activities of the neighbourhood watch (community policing) e.g. through provision of torches, uniforms and shoes. • Support economic activities in the area as part of corporate social responsibilities. • Reward for reports of vandalism and theft that may lead to capture. • Theft and vandalism cases must be reported to the police. • Regularly monitor the pipeline infrastructure. • Include the people from the local area in the work force.			
	Total				**98,600,000**

7.2 Irreversible or unavoidable impacts

Noise – The introduction of urban uses (e.g. pumps, and other activities) within the Proposed Project site would irreversibly increase the ambient noise environment of the immediate surrounding areas, however, the level of these impacts is less than significant.

Light and Glare – There would be some impacts associated with shading or artificial light and glare from roofs etc. However, these will be insignificant irreversible impacts.

Population, Housing and Employment – A local population would be established on the site. Other urban uses providing on-site employment opportunities would also be introduced, irreversibly committing part of the site to urban uses. These impacts will not be very significant. The beneficial impact on jobs/housing balance would be of long-term service to the local distribution of housing and employment uses.

Energy Consumption – The Proposed Project would result in an increase in the amount of energy resources to be committed, which would consist of hydropower electricity from the national grid. While it is anticipated that such energy consumption would not result in a substantial demand for energy resources relative to available supply, the Proposed Project's use of energy would be essentially irreversible, but not significant over the short term.

Utilities – An essentially permanent, irreversible demand on the water supply system would be created on the site, although reduced by minimised loses through the project design features. This impact, however, would not be significant, given that project-related water use has been accounted for in the water projections.

An irreversible incremental new demand upon the town's wastewater management system would be created. However, the proposed project would not contribute to any municipal wastewater flows to any local wastewater collection and treatment system, since one does not exist at the moment. However, the increase in the amount of sludge to be pumped from septic tanks for new developments would be irreversible.

Visual Qualities – Irreversible changes to the existing aesthetic character of the proposed project site would occur due to conversion of undeveloped land to areas for the water storage tanks and treatment plant. This would result in loss of visual relief in the urban setting, but such impacts, though irreversible, would be insignificant.

7.3 Environment and Social Monitoring Plan

The Environmental and Social Monitoring Plan, presented in Table 7.2 provides for monitoring to check the implementation of the enhancement and mitigation measures proposed in the Environmental and Social Management Plan (Table 7.1).

The monitoring plan identifies the roles and responsibilities of stakeholders to conduct the monitoring and the estimated cost of these monitoring activities. It provides monitoring indicators, means of their verification and the frequency of monitoring.

Implementation of the monitoring programme helps to verify the magnitude, duration and scope of the predicted impacts during and after implementing the enhancement and mitigation measures. It also helps to detect any unforeseen impacts at an early stage so that corrective measures can be taken, before significant damage takes place on the social, economic and biophysical components of the environment.

Table 7. 2: Environmental and Social Monitoring Plan for the Project

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
1.	**POSITIVE IMPACTS**						
1.1.	**Planning Phase**						
1.1	Creation of employment	Give priority to Local Consulting Firms;	Number of Local Firms engaged	Review of contracts signed with SRWB	Quarterly	District labour Officer	500,000
		In an even that the local consulting firms do not qualify, ensure that international firms have more than 50% of their professionals as Malawians.	Number of Malawians engaged by International Firms	Review of signed contracts between Consulting Firms and individual employees	Quarterly	District labour Officer	500,000
1.2.	**Construction Phase**						
1.2.1	Creation of employment opportunities including women, the vulnerable and the youth in the area	Inform local communities of employment opportunities and prioritise employment of local persons that qualify	Number of locals informed and employed through the council	Review of job applications forms and staff interview	Quarterly	District Labour Officer (DLO), District Social Welfare Officer, SRWB's Project Supervisor	1,000,000
		Match responsibilities of the employed women, members of the vulnerable group and youth to their abilities	Roles of the vulnerable groups compared against their abilities	Review of job descriptions			
		Include on-job-orientation and training to unskilled workers	Number of labourers trained	Review of task/job reports			
		Sensitize workers with HIV and AIDS to go for medical check-ups regularly and receive HIV	Number of times workers go for medical check-ups and receive	Review of employee files, Interviewing the workers and			

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		anti-retroviral treatment as required.	HIV anti-retroviral treatment	supervisors, Head count, Inspection, Review of sensitization report, Inspection of pay roll records			
		Provide employment to only people who are above 18 years of age	Age of employees				
		Workers must be treated and paid fairly for the services rendered	Number of cases of unfair treatment				
		Provide equal employment to women and men	Number of women employed against men				
		Engage the labour department to enforce the labour laws. (For example, the certificate of completion should compel the contactor to pay all the wages to the labourers on the contract).	Number of violations of labour laws				
		Wages must be above the minimum wage and overtime must be paid on time	Amount paid as wages including for over time				
1.2.2	Increase in trade opportunities	Pay building material suppliers within the agreed times	Time for paying suppliers	Review of procurement records	Quarterly during construction	District Commissioner, District Labour Officer (DLO), SRWB's Project Supervisor	1,000,000
		Source materials from approved licenced suppliers	Number of licenced suppliers used				
		Sensitize workers to save and invest	Number of workers	Staff interviews			

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
			sensitized and saving				
		Support and promote entrepreneurship skills amongst communities and business people in the project area	Number of businesses persons supported and promoted	Interviews, Review of business statistics			
		Promote of Village Savings and Loan (VSL) schemes during project implementation	Number of SMEs joining VSL schemes	Interviews, Review of VSL records			
1.2.3	Skills transfer to locals that will be employed by the project	Engage over 80 percent of the labour force from surrounding communities;	Number of locals employed	Employment record checking	Quarterly	SRWB and District Labour Officer	1,500,000
		Ensure that women are given employment opportunities when engaging labourers in construction works.	Number of women employed	Employment record checking	Quarterly	SRWB and District Labour Officer	1,500,000
1.2.4	Revenue generation for the Local Government	Employ adequate staff to maximise the collection of levies and taxes	Number of staff employed	Review of employment records	Biannually	District Monitoring, Information and Evaluation Officer (MIEO)	N/a
		Reinvest collected revenue in the development of existing facilities	Percent of revenue allocated to improvement of existing facilities	Review of revenue collection records, Interviews			
		Enforce penalties for non-payments of levies	Percentage of businesses penalised				
1.3.	**Operation Phase**						

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
1.3.1	Improved water quality and quantity	Ensure water reservoir tanks have adequate water all the time to cover for periods of no water pumping	Duration and number of times of no water supply to the consumers	Interviews, Review of water supply reports, Review of complaints of loss of water supply	Monthly	SRWB	N/a
		Sustain the desired performance of the water supply system through timely maintenance	Number of times maintenance works are conducted with respect to set dates	Review of maintenance works schedule and reports			
		Regularly conduct water quality tests at the water treatment plant, in the distribution lines and in the supply point and implement control measures where results are below safe water standards	Number of times water quality tests conducted, Reports of appropriate action when there are traces of unwanted elements in the water	Review of water tests results,			
		Employ adequate staff and ensure that they provide appropriate work inputs through proper work schedules	Number of staff with respect to the required staff; Presence and reports of following the work schedule	Review of employee records, Review of work schedules, Interviews			
		Sensitize water users on proper water management	Number of times sensitizations are conducted,	Review of sensitization reports, Review of	Quarterly		

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		practices and payment of water bills in time	Number of people sensitized, Number of cases of vandalism	reports on cases of vandalism			
		Prepare and implement an intake management plan	Availability and implementation of an intake management plan Quality of water at the intake	Audit of the implementation of the intake management plan Water quality tests	Quarterly for audit of the implementation of the intake management plan	Malawi Bureau of Standards (MBS), National Water Resources Authority	1.500,000
1.3.2	Reduced time to fetch water	Process water connection applications and provide water to the communities as quickly as possible	Duration between application for water and the time the connection is done	Review of new water connection reports, Interviews	Quarterly	SRWB	N/a
		Ensure the recommended maximum distances of 500 metres from houses to a water point/kiosk is observed when constructing communal water points	Distance between houses to a kiosk	Site visits, Interviews			
		Facilitate and support setting up of water kiosk management committees	Availability of functional water kiosk management committee	Review of kiosks management reports			
		Ensure water is available all the time at the water points	Number of times maintenance works are	Review of maintenance reports			

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
			conducted with respect to set dates for the works; Duration it takes to address water problems				
1.3.3	Improved sanitation, hygiene and health	Sustain the desired performance of Balaka and Liwonde Water Systems;	Number of cases for water related diseases	Review of health records from Balaka and Machinga District Hospitals, Visual inspections, Review of water quality tests results	Quarterly	SRWB, District Health Officer, Environmental Health Office	1.500,000
		Conduct water quality tests at the water treatment plant, in the distribution lines and in the supply points	Number of times water quality tests are conducted, Reports of appropriate action when there are traces of unwanted elements in the water, Review of water tests results				
		Sensitise communities on hygienic practices for handling water to avoid secondary contamination.	Number of times sensitizations and awareness meetings are conducted, Number of people sensitised, How the sanitation facilities are used	Review of sensitization reports, Interviews,			
		Promote general sanitation practices amongst communities in the project area.					

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
1.3.4	Improved socio-economic welfare in Balaka and Liwonde	Provide quality water, with minimal loss of supply, through system monitoring and regular maintenance	Water quality results, Average duration for loss of supply	Review of water supply reports, Review of water quality tests results	Quarterly	SRWB, District Social Welfare Office, District Water Office	N/a
		Support women and other vulnerable groups to start and operate business through appropriate training and start-up capital	Number of women and vulnerable groups supported to start businesses	Review of reports for supports with start-up capital			
		Make water costs affordable	Cost of water compared to income levels	Review of water tariffs and social-economic profile			
1.3.5	Enhanced gender and participation in development	Sensitize recruiting authorities to employ about 40% to 60% women	Number of sensitizations, awareness meetings conducted	Review of sensitization reports	Quarterly	District Social Welfare Office, SRWB	N/a
		Ensure there are also women in important positions	Number of women in important positions	Review of employee records			
		Promote the involvement of women in development activities through sensitization, advocacy and awareness.	Number of women involved in development activities	Review of sensitization records, Review of development activities records			
		Economically empower women within affected communities by linking them with District Councils Community	Number of women linked to economic empowerment programmes	Review of economic empowerment programme reports			

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		Service Investment Programme (COMSIP)					
1.3.6	Education benefits to girl child	Conduct sensitizations aimed at encouraging girls to enrol in schools	Number of sensitization meetings conducted	Review of sensitization reports	Quarterly	District Monitoring Information and Evaluation Office, District Education Office, District Social Welfare Office	N/a
		Provide the necessary support to schools to ensure that they have adequate resources to ensure the provision of quality of education	Availability of adequate resources in the schools	Review of education statistics			
		Provide scholarships and bursaries to deserving girls who cannot afford to pay the school fees	Number of deserving girls provided with bursaries				
		Provide adequate water and appropriate sanitation facilities in schools to support female students	Availability of adequate water supply and sanitation in schools				
1.3.7	Employment opportunities	Provide equal employment opportunities to both men and women	Number of employed women against the number of men	Interview, Review of employee records	Quarterly	SRWB, District Labour Office, Department of Labour, District Social Welfare Office	N/a
		As much as possible, provide employment opportunities to the local people, particularly women, vulnerable groups and the youth.	Percentage of locals in the labour force				

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		Train unskilled labour and where possible, some should be considered for employment with SRWB, especially in the areas of maintenance	Percentage of employees trained and allowed to continue to the operation and maintenance phase				
		Provide the necessary incentives to retain staff	Availability of incentives for retaining staff				
		Given-on-the-job training and refresher courses to the water supply scheme staff.	Number of staff receiving on job training				
		Observe payment for overtime, protection of the welfare of the employees and workers safety guidelines.	Number of complaints for non-payment of dues; Number of safety concerns received	Interview, Review of complaints records			
		Promote village savings and loan (VSL) schemes during project implementation	Presence of VSL groups and number of employees participating	Interview, Review of VSL records			
1.3.8	Increased revenue generation for SRWB	Sensitize institutions and households to pay bills and on time	Number of sensitizations, Percentage of paid bills and time for payment	Review of sensitization and engagement reports, Interviews, Audit of revenue	Quarterly	SRWB, Southern Region Water Board	N/a
		Properly manage revenue from the water supply	Availability of revenue book,				

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		through good book keeping, transparency and accountability.	Level of transparency and accountability	collection, expenditures			
		Engage the community to identify project which the water board can implement as part of cooperate social responsibility	Number of engagement, Level of engagement				
		Re-invest profits in the improvement and extension of the water supply system	Percentage of profits reinvested in extension of the system				
		Regularly review water supply tariffs with consideration of the consumers to avoid overcharging.	Number of times tariffs are reviewed, Level of prices				
		Properly manage water by replacing old pipes, repairing pipes to prevent leakages and extending intake pipes to avoid abstracting polluted water	Strength of pipes in relation to leakages, Length of intake pipes	Review of maintenance records, Inspections			
1.3.9	Increased development	Extend water supply to potential areas for development	Level of engagement between the district council and SRWB with respect to development plans and	Review of engagement records	Quarterly	SRWB, Balaka and Machinga District Councils	N/a
		Plan development areas in consultation with the SRWB and other service providers					

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
			extending water supply				
		Ensure continuous and reliable water supply and adequate sanitation to the supplied areas, to attract more settlers and businesses	Percentage of time water is available and adequacy of sanitation	Review of water supply reports, Interviews, Visual inspection on sanitation			
2.	**NEGATIVE IMPACTS**						
2.1.	**Planning and Designing Phase**						
1.	Loss or destruction of land and/ or property	Emphasis should be on minimising and avoiding any potential compensation costs when selecting the sites for the tanks and routes for the pipelines	Number of Project Affected Persons (PAPs) and property in the selected sites	Visual inspection, Review of compensation schedule	Twice before commencement of construction	SRWB's project supervisor, District Commissioner and Lands Officer for Machinga and Balaka, Regional Lands Office - South	500,000
		Where avoidance is not possible, identify affected households and compensate them for loss of land and other property in consultation with the Department of Lands	Signed compensation schedule including list of PAPs, their property and compensation received				
		Locate transmission and distribution lines within existing road reserves, as much as possible	Length of water transmission and distribution pipeline constructed along the road reserve	Inspection, Measurement	Twice before commencement of construction	SRWB's project supervisor, District Commissioner and Lands Officer for	500,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
			against the total length			Balaka and Machinga Regional Lands Office - South	
		Plan and prepare all compensations in coordination with the Balaka and Machinga District Councils Commissioners and the Department of Lands	Level of involvement of the District Commissioner in compensations	Interviews, Review of records of the compensation process			
2.	Land conflicts	Give adequate notice (one month as specified in the Water Works Act 1995) and obtain permission from land owners before commencing the civil works	Length of notice period before commencement of construction	Review of construction reports, Interviews	Once before commencement of construction	SRWB's project supervisor, District Development Planning Office, Environmental District Office	500,000
		Avoid disturbance of gardens during growing or harvesting seasons where possible	Number of gardens disturbed	Visual inspection	Monthly during construction of transmission pipes and tanks		500,000
2.2.	**Construction Phase**						
2.2.1.	Land degradation	Ensure that vegetation is cleared and excavations are done as designed to avoid unwarranted clearance of vegetation	Size of cleared and excavated areas in respect to required space	Interviews, Visual inspections, Review of construction reports	Monthly	Contractor, SRWB, Environmental District Office	1,500,000
		Avoid deposits/ piling of loose soils on sloppy ground or near drainage channels.	Slope and distance to drainage channels				
		Rehabilitate affected land by tilling the soils to	Size of rehabilitated land				

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		facilitate natural regeneration of vegetation	in respect to affected land				
		Use excavated soils to rehabilitate eroded areas	Volume of excavated soil used to eroded areas				
		Route the pipe and access roads following areas with as little vegetation as possible	Density of vegetation in areas where the pipe is constructed compared with other areas				
		Minimize the number and length of access roads and use existing roads or tracks as far as possible	Length and number of access roads, Number of areas where existing tracks are used				
		Store cement, paints, lubricants, and fuels in lined and covered areas.	Use of lined and covered areas for storage				
		Use new or fairly new construction equipment (tippers, excavators, compactors etc.), that may not easily cause oil spillages.	The number of years the construction equipment has been in use				
		Implement timely preventative maintenance of construction equipment	Number of times preventive maintenance is				

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		to avoid undue oil spillages resulting from breakdown or malfunctioning	conducted, Number of breakdowns reported				
		Service construction equipment at designated service areas to effectively manage used oils and any spillages.	Number of times construction vehicles and equipment are serviced				
		Provide appropriate spill kits.	Availability of appropriate spill kits				
		Collect and dispose wastes in designated disposal sites as allocated by Balaka and Machinga District Councils	Volume of wastes are collected and disposed to designated sites in respect to the total volume of wastes				
2.2.2.	Change in natural scenery and landscape of the project area due to stockpiles of solid waste	Confine land clearing and stockpiling to the area for construction of the pipelines, access roads and water storage tanks	Size of cleared and stockpiled areas with respect to required space	Interviews, Visual inspections, Review of construction reports	Monthly	Contractor, SRWB, Environmental District Office	1,500,000
		Rehabilitate affected areas by planting indigenous trees and backfilling of ruminant excavation works	Size of rehabilitated area				
		Dispose rubble and all other waste material at licensed sites, in collaboration with Balaka	Volume of waste disposed at licensed site				

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		and Machinga District Councils					
		Store and dispose contaminated waste at appropriate designated sites approved by Balaka and Machinga District Councils					
		Recycle or re-use waste materials and containers	Volume of waste recycled or re-used				
		Level the trench spoil to original land contour	Size of land levelled to original contour				
2.2.3.	Creation of borrow pits	Use the existing local quarry sites	Volume of quarry sourced from local quarry sites against the total volume of quarry	Interviews, Visual inspections, Review of construction reports	Monthly	Contractor, SRWB, Environmental District Office	1,500,000
		Get a permit for mining construction materials from Balaka and Machinga District Councils.	Presence of a permit for mining construction materials				
		Refill all borrow pits to be created during the upgrading, rehabilitation and expansion of the water supply systems	Number of barrow pits rehabilitated				

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		Barricade trenches and open pits and place clear signs to protect animals and people from falling into them	Presence of barricades, and appropriate signs, around trenches				
		Inform and sensitize the public about all open pits and trenches	Number of people sensitized				
		Supervise adequately the installation of storage tanks and pipelines and follow recommended procedures	Number of hours a supervisor is on site				
2.2.4.	Disruption of water supply	Give adequate notice of potential water disruption to the water users that could be affected	Number of times water supply is disrupted without notice	Review of construction reports, Interview	Monthly	Contractor, SRWB, District Water Office	1,500,000
		Provide alternative means of supplying water such as temporary by-pass piping or water bowsers where appropriate	Availability of alternative means of supplying water				
2.2.5.	Water pollution and siltation	Obtain licences from the water authority to abstract water and discharge wastewater	Presence of a water and wastewater discharge permit	Review of permit	Once	Contractor, SRWB, District Water Office	2,500,000
		Sell used oils to Raiply and ESCOM to be used for treating timber.	Volume of used oil sold	Review of construction reports	Monthly	Contractor, SRWB, Environmental District Office	
		Mix cement in areas, which are not connected to natural drainage systems.	Distance to natural drainage of areas for	Visual inspection, Interview,			

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
			cement and paint mixing	Measurement of distance			
		Store cement, paints, lubricants, and fuels in lined and covered areas.	Presence and size of cover and surface lining				
		Provide appropriate spill kits when working near water courses.	Availability (and number) of spill kit				
		Provide appropriate facilities for the collection of wastes on site such that they will not come into contact with water.	Availability of facilities used for disposing and collecting of wastes				
		Site all material storage areas at least 10m from watercourses.	Distance between storage area and watercourse				
		Provide appropriate barriers to separate worksites from water resources in order to prevent accidental spillage into water courses	Presence of and size of barrier separating work site and water resources				
2.2.6.	Air quality degradation/ increase respiratory disorders	Use new or fairly new vehicular equipment with exhaust gas emissions within permissible emission limit	Number of years equipment has been in use, Level of emissions from equipment	Review of procurement records, Inspection, Interviews	Monthly	Contractor, SRWB, Environmental District Office	1,500,000
		Timely and effectively maintain vehicles and equipment to prevent	Dates for servicing vehicles and equipment in	Review of maintenance records			

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		exhaust gas emissions above permissible emission limits.	respect to set dates for service				
		Apply water sprays when dust is being generated or at times of strong wind.	Number of times the site is sprayed with water to control dust, Dust complaints	Interviews, Inspection			
		Provide protective gear (dust masks) to workers and ensure that they wear them.	Reports of use of protective gear during dust generating activities	Interviews, Inspections			
		Erect a barrier around the work sites where major construction activities are taking place to break or reduce wind and dust movement	Perimeter with a barrier as compared to the total area that requires a barrier	Visual inspection			
		Store and handle sand and cement properly to limit dust generation	Reports of proper handling and storage of sand and cement				
		Optimize transportation management to avoid needless truck drives.	Number or errands for vehicles per day	Review of vehicle logs			
		Control vehicle speeds	Reports of over speeding, Presence of vehicle speed signs	Interviews, Visual inspections			

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		Reduce engine idling time	Time period vehicles remain on idling	Random checks, interviews			
		Provide or facilitate regular medical check-ups for construction workers to timely treat any occupational safety illnesses and disorders related to air pollution.	Number of times workers go for check-up	Review of human resources records/employee records			
2.2.7.	Loss or destruction of habitats for fauna and aquatic life	Ensure that vegetation is cleared and excavations are undertaken as per designs to avoid unwarranted clearance of vegetation;	Size of cleared and excavated areas compared to required space	Visual inspection, Measurement	Monthly	Contractor, SRWB, Environmental District Office	1,500,000
		Rehabilitate affected land by tilling the soils to facilitate natural regeneration of vegetation; and by planting trees and grass immediately after construction works to ensure restoration of lost flora.	Size of rehabilitated land				
		Ensure that construction vehicles and plant i.e. tippers, excavators, compactors etc. use only designated access roads to avoid soils degradation outside construction areas.	Access roads used by vehicles and plant machinery				

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
2.2.8.	Loss of vegetation	Limit vegetation clearing and excavations to only those areas specified in the designs	Size of cleared areas in relation to required space	Inspection, measurement	Monthly	Contractor, SRWB, Environmental District Office	1,500,000
		Plant appropriate trees and grasses in all disturbed areas.	Size of affected area planted with trees and grass				
		All the trees to be cut down during construction should be costed and appropriately compensated for.	Number of workers sensitized, Sites of conserved vegetation	Review of sensitization reports			
		Ensure that for every single tree to be cut down, 10 tree seedlings of a similar species should be planted in the adjacent areas.	Number of seedlings planted in adjacent areas	Inspection, Counting			
		Use cement bricks/ blocks for construction, where appropriate.	Size of area constructed using cement blocks	Inspection, Measurement			
		Train VNRMCs and other committees in catchment management and developing bye-laws and management plan agreements	Number of people in VNRMC and other committee trained; Presence of by-laws	Review of training reports, Review of by-laws			
		Rehabilitate affected land by tilling the soils to facilitate natural regeneration of vegetation; and by planting trees, including indigenous trees,	Size of rehabilitated sites	Inspection, Measurement			

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		and grass immediately after construction works to minimise soil erosion.					
		Sensitize employees and the community to conserve vegetation	Number of employee and community sensitized	Review of sensitization reports			
		Salvage vegetation (hollow logs, seedlings, seeds, etc.) affected by the project and reuse in areas to be planted with forest woodland.	Volume/number of reused plants materials	Interview			
2.2.9.	Occupational incidents and accidents	Induct workers on OSH requirements and repeat reminders on the same	Number of workers inducted and reports of reminders	Review of OSH induction records	Quarterly	Contractor, District Labour Office, SRWB	1,500,000
		Employ an OSH expert to monitor and ensure that appropriate equipment and acceptable codes of practice for various tasks are followed by workers at all times.	Presence of an OSH expert	Review of human resources records, Inspection			
		Provide appropriate personal protective equipment (PPEs) to construction workers; and to ensure that it is used at all times.	Availability and evidence of use of appropriate PPEs	Inspection, Interview			
		Conduct of risk assessment	Risk Assessment Report	Review of Reports			

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		Provide workers with well stocked First Aid Box	Presence of well stocked First AID Box	Site Visits			
		Train workers on first aid	Training Plan	Training Plan			
2.2.10.	Noise pollution	Provision of noise ear plugs/tags to workers that will be involved in noisy work environments and to ensure that the PPEs are in use at all times.	Number of workers provided and using appropriate PPEs	Inspection, head count	Quarterly	Contractor, District Labour Office, SRWB	1,500,000
2.2.11.	Increase in sexual relationships, unplanned pregnancies breaking up of families and sexual harassment	Sensitise communities on the disadvantages of indulging in extra-marital affairs	Number of sensitization meetings conducted	Review of sensitization records/minutes, Review of human resources records	Quarterly	Contractor, SRWB, District Social Welfare Office	1,500,000
		Conduct sensitization and awareness campaigns to encourage affected individuals to report cases of sexual harassment in the homes. Publicise places for reporting gender violence and sexual harassment.	Number of people sensitized, Number of reports of extra marital affairs				
		Enforce punitive and disciplinary measures, including dismissal from employment, on any project workers involved in illicit sex with school going girls.	Number of workers disciplined for engaging in illicit sex with school going girls				
		Engage stakeholders in encouraging and	Number of stakeholders engaged in	Review of stakeholders (e.g.			

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		empowering women to be financially independent	empowering women	NGO and CBO) activities records			
		Create a good work environment to allow female workers report any case of harassment	Availability of a good work environment, Number of harassment reports received	Interviews, Review of human resources records			
2.2.12.		Develop and implement Code of Conduct for workers.	Code of Conduct	Review of Contract between Client and Contractor	Bi-annual	SRWB	1,000,000
2.2.13.	Risk of increase in spread of HIV and AIDS	Sensitise workers and surrounding communities on the dangers of indulging in unprotected sex.	Number of times sensitization meetings held	Review of sensitisation minutes	Quarterly	Contractor, SRWB, Environmental District Office, District Health Offices	1,500,000
		Conduct HIV and AIDS sensitization and give lighter tasks to those with the virus or other health problems.	Number of HIV and AIDS sensitization campaigns conducted; Tasks assigned compared against their abilities	Review of sensitisation minutes, Review of employee files for job descriptions			
		Provide both male and female condoms to workers for appropriate use	Number of condoms provided, Number of employees accessing condoms	Interviews, Review of procurement records			

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
2.2.14.	Unequal employment	Encourage the contractor to employ women as well	Number of women employed versus the number of men	Head count, Review of employee files, Head count, Review of sensitization records	Quarterly	Contractor, District Labour Office, District Social Welfare Office	1,500,000
		Conduct gender meetings to encourage women and to instil confidence that they can also do the work that men do	Number of women sensitized, Number of women doing the work said to be for men				
		Ensure there are also women in important positions such as foreman and engineers	Number of women in important positions				
		Economically empower women within affected communities by linking them with the District Council's Community Service Investment Programme (COMSIP)	Number of women linked to COMSIP	Review of COMSIP records			
2.2.14	Increased risk of COVID-19 Transmission	Provide workers with handwashing facilities including hand sanitisers;	Availability of handwashing facilities and sanitisers	Site Visits	Monthly	District Health Office	1,000,000
		Promote and enforce the wearing of face masks;	Number of people putting on face masks	Site Visits	Monthly	District Health Office	1,000,000
		Ensure that workers are provided adequate working space	Adequate working space provided	Site Visits	Monthly	District Health Office	1,000,000

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
2.3.	**Demobilization Phase**						
2.3.1.	Loss of jobs due to completion of construction works	Provide alternative employment to employees e.g. as maintenance staff	Number of employees allowed to continue working	Review of the employee register	Once during the demobilization phase	Contractor, SRWB, District Labour Officer	1,500,000
		Provide adequate notice to employees to prepare themselves and secure alternative employment	The notice period before layoffs	Interviews, Review of employee files			
		Pay severance benefits to leaving workers in line with the labour regulations	Number of labourers to have received severance pay and amounts	Interviews, Review of severance pay records			
		Sensitize the workers and the general community to be saving	Number of workers saving from their pay; Number of people sensitized	Interviews, review of records of sensitizations			
		Sensitize the business persons to diversify and find alternative markets	Reports of business diversification and opening of new markets	Interviews			
2.3.2.	Abandonment of excavated areas for raw materials	Fill up and close pits after the construction works	Presence and number of filled pits after construction works	Visual inspection, Review of procurement records, Interviews	Once during the demobilization phase	Contractor, SRWB, Environmental District Officer	1,500,000
		Rehabilitate all work site	Size of area that is rehabilitated after construction				

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		Construction materials e.g. sand and clay soils should be sourced from licensed suppliers	Type of suppliers used for construction materials				
		Avoid making deep pits during the construction period	Size of pits				
2.4.	**Operation Phase**						
2.4.1	Increased pollution from wastewater and sludge	Enforce proper excreta and wastewater management	Evidence of proper waste management	Inspections	Quarterly	SRWB, Environmental District Office, District Health Office	N/A (To be done as part of their duties)
		Apply lime treatment to dewatered sludge to suppress pathogens and remove odour	Number of times quicklime is used to treat sludge	Interviews			
		Use licensed liquid waste handlers.	Number of times licensed liquid waste handlers are used	Review of waste collection records, Interview			
		Dry sludge on drying beds before disposing off in a dedicated disposal site.	Volume of waste dried before disposing				
		Prepare and enforce operational guidelines for sludge treatment and management.	Availability and reports of enforcement of operational guidelines for sludge treatment	Review of the operational guidelines, Interviews, Inspection			
		Conduct WASH activities to sensitize people on the benefits (including	Number of sensitizations; Number of	Review of diseases statistics			

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		prevention of cholera) of good the hygiene.	reported cholera cases				
2.3.3.	Increased risk of water contamination	Mend broken water pipes as quickly as possible	Duration broken pipes are left unrepaired	Review of water supply records	Quarterly	SRWB, Environmental District Office, District Water Office	N/A (To be done as part of their duties)
		Follow recommended guidelines for distances that must be maintained between liquid waste disposal facilities and water pipes	Distance between liquid waste disposal system and water pipes	Visual inspection			
		Repair malfunctioning human waste disposal facilities such as excreta disposal pipes, septic tanks and soakway pits as quickly as possible	Number of repaired human waste disposal facilities	Review of maintenance records			
		Move the water intake pipe as far into the lake as possible.	Length of intake pipes into the lake	Visual inspection	Once after commissioning of the upgraded water supply system	District Water Office	N/A (To be done as part of their duties)
2.3.4.	Increased risk of fire from the electrical systems	Ensure appropriate and approved electrical installations and equipment	Quality of installation and equipment	Inspections, Review of suppliers	Quarterly	SRWB, Environmental District Office, District Labour Office	
		Design and implement an emergency response plan.	Presence of an emergence response plan, Number of staff aware of, and	Review of the emergency response plan			

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
			able to use the plan				
		Install fire hydrants within the proposed development	Presence of a functioning fire hydrants	Inspection			
		Regularly monitor and maintain the water supply system.	Number of times the water supply system is monitored and repair works are conducted	Review of monitoring and maintenance reports			
		Install a fire extinguisher at the plant and train workers on how use.	Presence of a fire extinguisher	Inspection			
2.3.5.	Increased incidences of pipe bursts in the high-pressure pipes	Use the right sized pipes	Size of pipes against the pressure	Visual inspections, Interview	Quarterly	SRWB, Environmental District Office, District Water Office	N/A (To be done as part of their duties)
		Replace old pipes with new ones	Strength of pipes				
2.3.6	Increased chances of theft and vandalism due to increased size of infrastructure	• Periodically conduct consultations and sensitizations with villages and group village heads and security personnel. • Provide security at the intake, treatment plant and water reservoir sites. • Support activities of the neighbourhood	Missing equipment and units	Visual inspections, Interview	Through the operation period	SRWB	N/A (To be done as part of their duties)

ID	Potential Impact	Recommended enhancement/mitigation measure	Monitoring indicator	Means of monitoring	Monitoring frequency	Responsibility for monitoring	Monitoring cost (MK)/Year
		watch (community policing) e.g. through provision of torches, uniforms and shoes. • Support economic activities in the area as part of corporate social responsibilities. • Reward for reports of vandalism and theft that may lead to capture. • Theft and vandalism cases must be reported to the police. • Regularly monitor the pipeline infrastructure. • Include the people from the local area in the work force.					
Total							**38,000,000**

Chapter 8: Conclusion and Recommendations

8.1 Conclusion

This Environmental and Social Impact Assessment report has identified and assessed significant environmental and social impacts of the proposed rehabilitation, upgrading and expansion works for Balaka - Liwonde Water Supply System. The Project is beneficial as it will help the Southern Region Water Board to address some of the challenges, which it has been facing in its operations because of inadequate water supply and old infrastructure, resulting in failure to meet the increased demand for social and economic development.

However, development of the structures is likely to generate some negative impacts on the biophysical and socio-economic environment. The negative impacts, on overall, are assessed to be medium; mitigation measures have been recommended and are compiled into the Environmental and Social Management Plan (ESMP). A monitoring plan has also been prepared and will assist Southern Region Water Board, the Contractor and other key stakeholders to effectively monitor the implementation of the Environmental and Social Management Plan and ensure that Key Performance Indicators are achieved. Hence, the project should be allowed to proceed.

8.2 Recommendations

To ensure satisfactory achievement of environmental and social sustainability in the implementation of the proposed project, the following recommendations are made:

i. Water abstraction has to be in accordance to the Water Right, which SRWB will be required to obtain before the project can be implemented.
ii. The project should be fully supported by all the relevant institutions;
iii. Adequate financial support should be allocated to realise the full potential to improve the socio-economic wellbeing of the targeted communities;
iv. The environmental and social impacts should be avoided or minimised to the greatest extent possible by fully implementing the enhancement and mitigation measures advanced in this report;
v. The communities have a negative perception of SRWB and how it calculates water tariffs, the SRWB must conduct adequate sensitization on water supply pricing and management.
vi. SRWB must allocate additional funds in cooperate social responsibilities to improve its image among the communities,
vii. During construction, the contractor should avoid clearing any protected or endangered plant species. Where they are removed, they must be replanted.
viii. Adequate and fair compensation must be given to all the affected people before construction activities start;
ix. SRWB and the respective key stakeholders should support and facilitate employment of women, the youth and vulnerable groups to eliminate potential gender and social imbalances; where possible and appropriate, employment of local people from the project area (excluding juveniles) must be prioritised to encourage community ownership and sustainability of the project.

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Annex 1: Terms of Reference

Telephone: 01 771 111
Telefax No.: 01 773 379
Our Reference No.:EAD 99/07/05
Your Reference
No.....

Communications should be addressed to:
The Director of Environmental Affairs

ENVIRONMENTAL AFFAIRS DEPARTMENT
LINGADZI HOUSE
CITY CENTRE
PRIVATE BAG 394
LILONGWE 3
MALAWI

17th February, 2020

The Chief Executive Officer
Southern Region Water Board
Private Bag 72
Zomba

Dear Sir,

REVIEW OF PROJECT BRIEF FOR THE PROPOSED EXTENSION OF MANGOCHI POTABLE WATER SUPPLY PROJECT AND UPGRADING AND EXTENSION OF LIWONDE WATER SUPPLY INCLUDING BALAKA TOWN PROJECT

Reference is made to your project brief on the subject captioned above. I wish to inform you that the project brief was reviewed.

Based on the nature and scale of activities for the proposed project, I wish to inform you that you are required to conduct an Environmental and Social Impact Assessment (ESIA) which is a legal requirement of the Environment Management Act (1996). Find attached Terms of Reference for undertaking the ESIA.

Should you require any further information or clarification on the foregoing, please do not hesitate to contact us.

Yours faithfully,

Shamiso Najira
For: DIRECTOR OF ENVIRONMENTAL AFFAIRS

Attd:

TERMS OF REFERENCE FOR THE LIWONDE-BALAKA WATER SUPPLY PROJECT

1. Provide a full description of the nature of the project with respect to the name of the proponent, the postal and physical address, the spatial location with respect to natural resources and human settlement of the project site, the estimated project cost, size of land for the project site, resource requirements (raw materials, equipment), the number of people to be employed for all operations (provide a breakdown of males and females, locals and non-locals), number of people to be residing on the project area, waste disposal and access roads.
2. Provide a site-specific visible topographic maps of the area (Scale 1:50,000) showing the proposed sites and (1: 10,000) showing existing establishments in the proposed area and surrounding areas. A site plan for the project should be provided. All maps should be in color to portray the themes clearly.
3. Describe main activities to be undertaken in implementation of the proposed project at the site covering pre-construction, construction, demobilisation and operation phase. In the description include the type of machinery to be used, nature and quantity of wastes that will be generated, facilities for appropriate waste disposal, and management of waste and estimated costs for the activities.
4. State the reason for selecting the proposed site of the project as opposed to other sites. Consider alternatives to the project, such as alternative sites and the reason for selecting the preferred option including the 'no project' alternative. The EIA should also consider 'within – project' alternatives e.g. designs, technology etc.
5. Provide a concise description of the existing biophysical characteristics and the socio-economic environment status of the proposed area by identifying and analyzing:
    a. Physical conditions: soil, geology, site topography, temperature, rainfall patterns and drainage system (water courses);
    b. Biological Resources: scope of vegetative resources of the project area including riparian vegetation, extent of terrestrial and aquatic fauna;
    c. Socio-economic conditions: demographic trend within and around the project area, main land uses, agriculture and marketing, business activities, basic infrastructure and health situation including HIV and AIDS prevalence rates; and
    d. Any changes anticipated during implementation of the project area.
6. Describe the major activities to be undertaken for the construction and operation of the proposed project. Identify the main construction and operation activities of the project including the construction of the Septic tanks, installation of pipelines, digging of trenches etc. Provide a full description of the nature and quantity of wastes to be generated, the facility for appropriate disposal and management of waste and the equipment to be used.
7. Identify the potential short and long term environmental impacts associated with the proposed project, focusing on both the positive and negative effects as well as the effects

to the biophysical, social, economic and cultural components of the environment. The potential impacts must include those related to:

a. Project location (e.g. loss of forest reserves, loss of agricultural land, impact on flora and fauna, impact on cultural site, impact of water resource abstraction in terms of available quantities of water for other upstream and downstream users and water quality and resettlement of people);
b. Project construction (e.g. soil erosion, disposal of construction spoils);
c. Project operation (conflict of use, waste management related to septic tanks, communal water points etc).

8. Prescribe the measures to eliminate, reduce or mitigate the negative effects identified and the measures to enhance the positive effects.
9. Propose an Environmental and Social Management Plan by which all of the measures prescribed above, will be carried out. Indicate the budget for the recommended mitigation measures, specifications of who will be responsible for these measures and the schedule when these measures will take place during construction and operation of the project.
10. Propose an Environmental and Social Management and Monitoring Plan by which all mitigation measures recommended in Environmental and Social Management Plan will be monitored. The plan should include the activities, frequency of monitoring, the key monitoring indicators, resources required and the authorities responsible for monitoring the exercises.
11. Provide an account of all regulatory licenses and approvals obtained for the proposed project to ensure that they are in line with sound environmental management practices and are in compliance with relevant existing legislation. Describe pertinent legislation and policies pertaining to the project and their implications on the project. Reference should at least be made but not limited to the Environment Management Act, Forestry Act, Water Resources Act, National Water Policy, National Environment Policy, Malawi National Land Policy, Malawi Development and Growth Strategy, Occupational Safety, Health and Welfare Act and other relevant policies and piece of legislation.
12. Undertake stakeholders' consultations to ensure key interested and affected stakeholders are involved in the Environmental Impact Assessment process. Incorporate their views in the report and indicate a record of consultations in the appendices parts of the report. Only senior officers should be consulted.
13. The preparation, presentation and structure of the EIA report should follow the format in the Guidelines of Environmental Impact Assessment for Malawi (1997) and the Guidelines for Environmental Impact Assessment (EIA) for projects in Water Sector.
14. Assess Trans-boundary impacts of the projects on downstream countries according to 1991 Espoo Convention on Environmental Impact in a Trans-boundary Context.
15. Ensure that the District Commissioners (DCs) as well as the Environmental District Officers (EDOs) for both Balaka and Mangochi Districts are adequately consulted.

16. Printing of ESIA reports should be done on an A4 paper preferably using Times New Romans with a font size 12.
17. Attach the TORs and the letter accompanying the TORs in the Appendices part of the report.
18. Submit 15 hard copies for each project and two soft copies of the EIA report to the Director of Environmental Affairs.
19. Provide the names of the EIA Team and their respective fields including Environmental and Social Experts.

Annex 2: List of Stakeholders Consulted

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED EXTENSION WORKS FOR MANGOCHI POTABLE WATER SUPPLY, UPGRADING AND EXTENSION OF LIWONDE WATER SUPPLY INCLUDING BALAKA TOWN

PLACE OF THE MEETING: Balaka District Council DATE OF THE MEETING: ____________

Name	Position/Occupation	Phone number	Signature
Geoffrey Kuchingo	EDO	0993197776	[signature]
Alex J. Makuwinga	ADWO	0994948648	[signature]
Violet Kamasumbi	Lands Officer	0884601079	[signature]
Paul Mulioztha	District forestry officer	0993381294	[signature]
Ronzi Ntalingwe	District Com officer	0888862953	[signature]
Ireen Taombe	Env Health officer	0888157543	[signature]
Samuel Khomani	S/M – MRWAT	0993226963	[signature]

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED EXTENSION WORKS FOR MANGOCHI POTABLE WATER SUPPLY, UPGRADING AND EXTENSION OF LIWONDE WATER SUPPLY INCLUDING BALAKA TOWN

PLACE OF THE MEETING: Liwonde DATE OF THE MEETING: 02 August 2019

Name	Position/Occupation	Phone number	Signature
KACHINJIKA GILBERT	ACDO	0884113798	[signature]
SHARON CHIRUMO	AYO	0993059280	[signature]
Linda Mapmonda	DHO	0995911135	[signature]
MARK D KALIMBA	INTAINEE LANDS	0882540513	MKalim
Elliot Lungu	District Fisheries Officer	0999438274	ELungu
McBen Mukasiwo	DFO-Intern	0888171979	[signature]
Chiwiriko Kasipa	Community Development Officer	0999315454	[signature]
Macmillan Magomero	District Gender officer	0881727668	[signature]

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED EXTENSION WORKS FOR MANGOCHI POTABLE WATER SUPPLY, UPGRADING AND EXTENSION OF LIWONDE WATER SUPPLY INCLUDING BALAKA TOWN

PLACE OF THE MEETING: ~~Ulwut~~ Balaka DATE OF THE MEETING: 31 August 2019

Name	Position/Occupation	Phone number	Signature
L. Kapalamula	Works Supervisor	0888316509	
H. Nyirenda	District Gender Officer	0881659270	
C. Ndaona	Social Welfare Officer	0884483661	
Ekari Pallkera	WV Development Facilitator	0885685501	
John Mawaya	Senior Environmental Health Officer	0994486181	

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED EXTENSION WORKS FOR MANGOCHI POTABLE WATER SUPPLY, UPGRADING AND EXTENSION OF LIWONDE WATER SUPPLY INCLUDING BALAKA TOWN

PLACE OF THE MEETING: MACHINGA SRB OFFICE DATE OF THE MEETING: 2 August 2019

Name	Position/Occupation	Phone number	Signature
Prisca Malenga	consultant	0992125015	
Boniface Mokwenda	CPEA	0884491651	

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED EXTENSION WORKS FOR MANGOCHI POTABLE WATER SUPPLY, UPGRADING AND EXTENSION OF LIWONDE WATER SUPPLY INCLUDING BALAKA TOWN

PLACE OF THE MEETING: LIWONDE DATE OF THE MEETING: 01 August 2019

Name	Position/Occupation	Phone number	Signature
Steve Meja	District Water Dev. Officer	0999354222	
MATTHEWS KALAMA	DETO	0995322993	
Loreness Banda	District coordinator TONECO	0992540823	
PLAN	MALAWI — LIWONDE		01.08.19
Trevor Hachim	MERL Coordinator	0995105468	
Charles Gunsam	Distribution Officer	0881321104	
Lawrence Mauludi	Project Manager	0999505765	
Vitumbiko Nkoka	CPIE officer	0999239071	
Dango Nyirenda	~~Team leader~~	0993255803	
Cynthia Mithi	WASH specialist	0999095295	

SOUTHERN REGION WATER BOARD

MACHINGA DISTRICT NSAMALA AND KAPALAMULA ADC COMMITTEE MEETING – UPGRADING OF LIWONDE WATER SUPPLY UNDER EIB PROJECT HELD ON 14TH JUNE, 2022

No.	Name	Ministry/ Organization	Designation/ Position/Capacity	VILLAGE
1	Louis Massinje	water office Balaka	water development facilitator (Interim)	Balaka district Council
2	Regina Zande	master Forestry	ADFO	BLK district Council
3	Ellen Mpando	Labour	SLA	BLK District Council
4	Thomas Gilbert	DPD	DPD intern	BLK District Council
5	Hanif Kunginde	DPD	DPD Intern	BLK District Council
6	Hingson Phiri	Com Dev	SCDA	MJamala

SOUTHERN REGION WATER BOARD

MACHINGA DISTRICT NSAMALA AND KAPALAMULA ADC COMMITTEE MEETING – UPGRADING OF LIWONDE WATER SUPPLY UNDER EIB PROJECT HELD ON 14TH JUNE, 2022

No.	Name	Ministry/ Organization	Designation/ Position/Capacity	VILLAGE
1	LOUIS Mssinje	water office Balaka	water development facilitator Clerk	Balaka district Council
2	Regina Zandemasse	Forestry	ADFO	BLK district Council
3	Ellen Mpando	Labour	SLA	BLK District Council
4	Thomas Gilbert	DPD	DPD intern	BLK District Council
5	Hanif Kunjande	DPD	DPD Intern	BLK District Council
6	Hungson Phiri	Dem Dev	SCDA	MJamala

SOUTHERN REGION WATER BOARD

MACHINGA DISTRICT NSAMALA AND KAPALAMULA ADC COMMITTEE MEETING – UPGRADING OF LIWONDE WATER SUPPLY UNDER EIB PROJECT HELD ON 14TH JUNE, 2022

No.	Name	Ministry/ Organization	Designation/ Position/Capacity	VILLAGE/ CELL PHONE CONTACT
1	Jean Nakolon		ADC Member	Kapalamula
2	Chimwemwe Kapalo		ADC vice chair	Kapalamula
3	Eddah Gondwe		ADC Member	Kapalamula
4	Alfred Jerem		ADC Member	Kapalamula
5	James Kalizo		ADC Chair	Kapalamula

SOUTHERN REGION WATER BOARD

MACHINGA DISTRICT NSAMALA AND KAPALAMULA ADC COMMITTEE MEETING – UPGRADING OF LIWONDE WATER SUPPLY UNDER EIB PROJECT HELD ON 14TH JUNE, 2022

No.	Name	Ministry/ Organization	Designation/ Position/Capacity	VILLAGE/ ~~CELL PHONE~~ CONTACT
1	Jean Nakalonji		ADC Member	Kapalamula
2	Chimwemwe Kapolo		ADC vice chair	Kapalamula
3	Eddah Gondwe		ADC Member	Kapalamula
4	Alfred Jeremia		ADC Member	Kapalamula
5	James Kaliza		ADC Chair	Kapalamula

No.	Name	Ministry/ Organization	Designation/ Position/Capacity	VILLAGE ~~CELL PHONE CONTACT~~
6	Eunice Mayeso		ADC Member	Kapalamula
7	Meria Jeremia		A.DC Member	Khoswe
8	Christina Chimwano		A DC member	James ~~Kapalamula~~
9	Harry Namakonje		ADC Member	Kapalamula
10	Steven. Kaduya		ADC Member	K'hoswe
11	NEWTON CHIMIMBA		ADC MEMBER	KHOSWE
12	MASALISO CHAWANJE		ADC MEMBER	KHOSWE
13	Golden Chirkanji		ADC Member	James

No.	Name	Ministry/ Organization	Designation/ Position/Capacity	VILLAGE ~~CELL PHONE CONTACT~~
14	AMOS CHINOWA	~~A D C MEMBER~~	A D C MEMBER	~~KAPALAMULA~~
15	WILLIE MWASIANDO		A.D.C TREASURE	KAPALAMULA
16	Emanuel Wandolosi		STA	Kapalamula
17	GETRUDE BOTHA	COM. DEV.	ADC SECRETARY	KAPALAMULA
18				
19				
20				
21				

STA KAPALAMULA

Name	Village or GVH VPC	Phone Number	Signature
MADALITSO CHAWANJE	Kitoswe	0993558376	M. CHAWANJE
Golden Chidzanja	James VDC	0998305832	
AMOS CHIMOWA	KAPALAMULA	0992858991	
Nellie Mwasiyano	KAPALAMULA	0990047059	
Emanuel Windolosi	STA	0998150995	E. Windolosi
GETRUDE BOTHA	COM DEV	0883937170	

STA KAPALAMULA VDC

List of Community Members consulted; June 2022

Name	Village or GVH VDC	Phone Number	Signature
Jean Makoloni	~~KAPALAMULA VDC, M~~	0998 60 7691	
Chimwemwe Kapolo	KAPALAMULA	0888 413 304	
Eddah Gondwe	KAPALAMULA	0993374528	E. Gondwe
Alfred Jeremiah	Kapalamula	0995942149	
James Kaliza	~~Kapalamula VDC~~ James VDC	0996069659	
Eunice Mayeso	Kapalamula	0995942616	G. Mayeso
Meria Jeremia	Khoswe	0999872774	M. Jeremia
christina chimwaza	James VDC	0991139935	
Harry Namakonje	Kapalamula	0993942964	
Steven-Kadya	~~Kapala~~ Khoswe	0997716135	S. Leadya
NEWTON CHIMIMBA	KHOSWE VDC CHIEF	0994767198	

List of Community Members consulted; June 2022

Name	Village or GVH	Phone Number	Signature
Damson Lesta	MTonya	0880860216	

List of Community Members consulted; June 2022 MSAMALA ADC

Name	~~Village or GVH~~ VDC	Phone Number	Signature
SANGWEDI VITO	MPULULA VDC	0888387309	
KIDSON TAMBALA	CHIYEMBE KOZO VDC	0882110771	
Ishart Nakoma Chipiko	MPULULA VDC	0884113104	
MARY MTAMBALIKA	KAMBADI VDC	0996285732	M. Mtambalika
Alice Minjolo	Magombela	0997743385	
SHYLINE MATIKI	NTONYA	0996009622	
GRACE MACHINGA	KWITANDA	0884244226	G. Machi
Rhoda Chagunda	Ntalika	0994166590	R. Chagunda
Hamia James	chendausiku	0996946606	H. James
Shamima Kabichi	DISI	0997573006	S. Kabichi
Katarina Jobson	Tako	0998127214	

List of Community Members consulted; June 2022

Name	~~Village or GVH~~ VDC	Phone Number	Signature
BETTY MKWINDA	MCHENGA	0995322589	B. Mkwinda
Alice John	Kalimba	0883195664	A John
Antony KACHINGWE	M'MANGA	0997662566	e.
Rose Kida	Mmanga	0999541908	R. Kida
Janet AFIKI	Nsamala	0995351579	J. AFIKI
DYTON LOGATH	[illegible]	0998072922	Dogal
Mathias Steven	CHITALA	0882167225	[illegible]

List of Community Members consulted; June 2022

Name	~~Village or GVH~~ Position	Phone Number	Signature
Alex Makwinja	ADWO	0888520520	
Hangsen Phiri	SCHA Com Law	0991059124	
Louis Masanje	DWO/Mulanje	08843630	
Regina Zande Master	ADFO	0888554969	
Ellen Mpando	SLA	0999124665	
Thomas Gilbert	DPD Intern	0881370650	
Hanif Kunguinde	DPD Intern	0882457092	

List of Community Members consulted; June 2022

Name	~~Village or GVH~~ VDC	Phone Number	Signature
ZIONE PHIRI	ADC CHAIR	0997235613	Z. PHIRI
LACKSON LIKAWA	VICE ADC CHAIR	0888340766	LLikawa
DANIEL JUMBE	Chimwala	0993829172	D Jumbe
Jimmy Kasito	Ntalika	099 1185303	
Charles Kamwendo	~~Kwitanda~~ ADC MEMBER	0997699653	
Grace Galaffa	NSamala Treasure	0884098354	G. Galaffa
Dan Mateyu	ADC MEMBER	0995372998	D Mateyu
Chipiliro Hamilton	VDC Secretary	0993354066	
John Akileni	~~V~~ADC Member	0998300896	
Lydia James	A.D.C Member	0982169126	L. James
NIXON LEMANI	ADC Member	0995545340	

Name	Position	Phone Number	Signature
Jarvis Mwenechanya	Environmental District Officer, Machinga District Council	0999808320	Consulted by phone
Ida Mkwezalamba	Environmental District Officer, Balaka District Council	0999682117	Consulted by phone
Lukresia Matekenya	District Water Development Officer, Balaka District Council	0888004869	Consulted by phone

Annex 3: Main issues raised during consultations

Annex 3.1: General issues raised by local communities

No.	Main Issues raised	Method of incorporation in the ESIA Process	Institution/Individual that raised the issue(s)
1	**Positive Impacts:** The lodge manager anticipates increased operation of its restaurant facilities with reliable supply of potable water from the Southern Region Water Board. Currently, the restaurant only operates several times a week due to limited supply of potable water. The project will likely reduce the prevalence of water borne diseases due to improved supply of potable water. Hygiene will be improved (laundry, garden and other domestic uses) at the lodge facilities due to improved water supply. Improved water supply will also reduce the occurrence of cancellations of reservations by potential guests due to limited access to potable water. **Negative Impacts:** Per Mr. Mwasama, the Southern Region Water Board currently fails to adequately supply water to its customers. The Lodge	The ESIA report has incorporated these issues in the ESMP	John Mwasama (Lodge Manager Bola Moyo Lodge, Balaka

No.	Main Issues raised	Method of incorporation in the ESIA Process	Institution/Individual that raised the issue(s)
	can at times experience water outages lasting two or more days. Failure to implement this project will result in continual loss of business by the lodge. The current billing system of the Southern Region Water board is not consistent and is not user friendly; customers have difficulty deciphering the content on their bills. Most people in the community lack water management skills. Therefore, simply increasing water access and end users will only lead to an increase in water mismanagement by the community if there is no sufficient water management education or sensitization.		
2	**Positive impacts:** The project will increase access to potable water by the communities. Currently, women travel over an hour to fetch water at the borehole. The extension of water supply will reduce waiting times at the borehole hence they will have more time to do other household activities like farming. The community's hygiene will improve, because people will have access to	These have been documented and incorporated in the ESIA report	Frank Luka, Frazer kapalamula, Nelson Simango, Neliya Simango, Esther Gunde, Latifa Musa, Eliza Joseph, Dorothy Mulesi, Latifa Musa, Eliza Joseph, Dorothy Muleso, Angella Humba, Felita Chingeni, Isaack manganic, Kondwani Kanje, Elita Guwa (Chingeni Trading Center, GVH Ndoya, Dinala Village).

No.	Main Issues raised	Method of incorporation in the ESIA Process	Institution/Individual that raised the issue(s)
	portable water for domestic activities The interviewees also indicated that number of cases related to water borne diseases will be reduced, because people will have access to clean and portable water. The interviewees also stated that the project will bring job opportunities for the community members In the community, the school children are required to fetch their own bathing water to get ready for school. However, with upcoming project, the school children will start going to school on time because the time it takes them to fetch water will be reduced. **Negative impacts:** Because some men and women will engage in sexual activities with the project workers, there will be unwanted pregnancies, breaking up of families, the spread of sexually transmitted diseases and HIV and AIDS Also, security will be compromised in the community because different people will be coming in the community		

No.	Main Issues raised	Method of incorporation in the ESIA Process	Institution/Individual that raised the issue(s)
3	**Positive impacts:** The project will cut some costs on electricity bills for electrical pumps that are used to pump water from the bore hole, since the lodge uses only borehole water. The Lodge manager also stated that the access to portable water for the Lodge will improve. The land scape of the Lodge will improve because they will have enough water to irrigate the flowers of which is impossible now with borehole water. Further, the project will improve the hygiene at the lodge, because there will be adequate water for laundry, lodge garden and bathing. The lodge will not be losing customers, because access to portable water will improve the lodge's standards to meet customer's needs. **Negative impacts:** The Lodge has stayed for two years without water from the water board and the Lodge manager expressed his concerns that if they extend their	These have been documented and incorporated in the ESIA report	David Mtandama (Lodge Manager Zembani Lodge

No.	Main Issues raised	Method of incorporation in the ESIA Process	Institution/Individual that raised the issue(s)
	water supply the situation will be worse. Billing system of Sothern Region Water board is not consistent and increasing the number of customers will make the situation unbearable for the customers. With that huge investment, the water will be expensive for the consumers, as a result a lot of people will not afford it.		

Annex 3.2: Main issues raised Machinga DESC Members

No.	Main Issues raised	Method of incorporation in the ESIA Process	Institution/Individual that raised the issue(s)
1	• The DFO pointed out that the proposed project is vital as it would help solve the water problems that people in the district and other surrounding districts face in regards to potable water. • The DFO and his Assistant also mentioned that the project would positively contribute to the improvement of water sanitation and hygiene in the project areas. • Additionally, it will contribute to the socio-economic growth of the project impact areas and to the nation. • The interviewee anticipates that the Department of Forestry will be involved in planting of trees in all damaged and disturbed areas by the project. • The role of the Department of Forestry in this project will be to assist the Client with the monitoring of project activities and providing necessary guidance to the contractor on	The ESMP in the ESIA has the incorporated these issues.	Frank Mbaya (District Forestry Officer) – Tel: 0888444955 and Mrs. Fyness Mkandawire (Assistant Forestry Officer) – Tel: 0995965684 Machinga District Council

No.	Main Issues raised	Method of incorporation in the ESIA Process	Institution/Individual that raised the issue(s)
	construction of trenches and water tanks. • To be involved in selecting appropriate tree seedlings for planting in all damaged and disturbed areas.		
2	• The project will improve water supply to Liwonde town and will provide water which is safer for human use. • The project should ensure that the intake is away from the area where sewer pipe for the town are located to avoid spillage.	The ESIA report has incorporated these issues and those that have to do with designs, the design engineers will be communicated	Jarvis Mwenechanya, Environmental District Officer (EDO)Machinga District Council 0999808320
3	• The project will ease water problems that Liwonde town has been experiencing due to the growing population • The design should ensure that the sewer pipes are away from the water intake to avoid leakages which can contaminate the water.	The design engineers for the project will be communicated to take into account this issue	Steve Meja, Machinga District Water Officer, 0999304222

Annex 3.3: Main issues raised by Balaka DESC Members

No.	Main Issues raised	Response/ Method of incorporation in the ESIA Process	Institution/ Individual that raised the issues
1	• Balaka Town being a very dry area in Malawi, currently relies on potable water supplied from Mpira, Ntcheu. The source has adequate water during the rainy season (late November to December through March), but the area is arid during the dry season (July through November) as the dam levels drop. The surrounding communities, however, do not get adequate water supply all year round. Instead, these communities rely on boreholes for water supply. • The interviewee anticipates that young girls and women are most likely to be negatively impacted as they are prone to be exploited by project workers. • The interviewee anticipates all members of a household to benefit most from the implementation of this project. • **Employment Opportunities**: Not hiring locals will likely lead to conflicts with the project team and client. Therefore, it is important to prioritize local skilled and non-skilled workers before sourcing from elsewhere.	The ESIA has recommended Continual means to communicate and educate communities. The project will ensure provision of reliable and sufficient water source from the Shire River. Issues to do with RAP and Employment and prevention of GBV have been incorporated in the report.	Karol Nyalugwe, Community Development Officer, Balaka District Council

No.	Main Issues raised	Response/ Method of incorporation in the ESIA Process	Institution/ Individual that raised the issues
	• **Loss of property:** Affected members of communities will need to be adequately compensated or offered other means of restoring and improving their livelihoods. Also, where possible, the project should at all costs avoid affecting the property of locals. • **Conflict resolution involvement: P**art of the Grievance Management Committee should be aactively involved in the resolution of conflicts and sensitizing communities.		
2	It was the first time that district water development office was officially hearing about this proposed project to expand the Liwonde water supply system to reach all the way to Balaka Town. It was mentioned by the Assistant DWO that as an office, they run the Mpira-Balaka piped water scheme through the Mpira-Balaka Water User Association. This piped water scheme was initially meant to supply the rural areas parts of Ntcheu, Balaka, Neno and Mangochi districts, which has a supply area of about 1,900 km^2. Nevertheless, due to challenges to access potable water, the scheme is supplying urban areas including Balaka Town. Further, the SRWB is buying water from the Mpira-Balaka WUA and selling it to the people in Balaka Town.	The ESIA report has recommended on how to deal with issues of compensation.	Mr. Alex Makwinja, Assistant District Water Officer

No.	Main Issues raised	Response/ Method of incorporation in the ESIA Process	Institution/ Individual that raised the issues
	According to the Assistant DWO, the Mpira-Balaka piped water scheme is currently failing to effectively supply water to its beneficiaries due to a wide number of factors ranging from encroachment of intake catchment area, friction of policies between authorities in the water, agriculture and forestry sectors as well as political interference, where supply of water has been extended to more people contrary to the capacity of the limited resource. Furthermore, the Assistant DWO indicated that the current problems with the Mpira-Balaka piped water scheme are evident in the current frequent water supply interruptions to customers; which is the source of the customers' unwillingness to pay for the supplied water. The Assistant DWO noted that the problem with the scheme is retrievable if the source dam for the scheme is rehabilitated and mitigation measures are put in place to restrict the encroachment as well as to reduce soil erosion and dam siltation. In addition, the Assistant DWO stated that good coordination between the relevant government authorities concerning the management of the Mpira-Balaka piped water scheme, could help effectively implement the mitigation measures and ensure that the scheme is revived.		

No.	Main Issues raised	Response/ Method of incorporation in the ESIA Process	Institution/ Individual that raised the issues
	With regard to the proposed project by the SRWB to supply water to Balaka Town from the Liwonde water supply system, the Assistant DWO is of the view that the project would very helpful because it will supply more potable water to the Balaka Town and will relieve the pressure that is on the Mpira-Balaka Scheme to supply water to both rural and urban areas. • The expectation on his part is that once the SRWB project is implemented, it will solve the problems of water shortage the town of Balaka is currently facing. Accordingly, this will stop the feelings of shame felt by the district water office workers within their communities as they are being accused of being responsible for the water woes the town is experiencing. • With the coming of this SRWB project, the Assistant DWO's other expectation is that the water from the Mpira-Balaka Scheme will now be freed to supply the rural areas (and not the urban area of Balaka Town) as it was initially intended. • More than 75% of the impacts from the proposed SRWB project will be positive, he also foresees some possible negative impacts. Such as probable conflicts on land/property		

No.	Main Issues raised	Response/ Method of incorporation in the ESIA Process	Institution/ Individual that raised the issues
	losses, damage to the natural environment as well as spread of sexually transmitted infections from migratory workers. • If there are any issues of compensation for loss of property and livelihoods, these should be well handled prior to commencement of the project.		
3	• Currently the salinity of the water is not that good and the coming in of this project will improve water quality • With the increase of population of the town, this project will ensure adequate water supply to the residents.	The ESIA report has incorporated these issues as positive impacts of the project	Lukressia Matekenya (District Water Development Officer-Balaka District Water Office)
4	There is need to ensure thorough consultation with the communities in relation to issues of compensation for trees, land etc. There is also need to ensure that labour force is taken from the community. Issues that have to do with GBV have to be looked into. Ensure that mechanisms are put in place to prevent STI's, Child labour and provision of PPE's. Agreements that the contractor makes with the local communities must be followed.	The Consultants have prepared a Labour Management Plan which has been submitted as Appendix 1 where labour issues have been detailed	Ida Mkwezalamba (Acting Environmental District Officer-Balaka District Council)
5	There is need to have a good working relationship between the Contractor and the Supervising Engineer as this has a bearing on the success of the water supply project	This has been noted and will be communicated to PCO	Ida Mkwezalamba (Acting Environmental District Officer-Balaka District Council)

No.	Main Issues raised	Response/ Method of incorporation in the ESIA Process	Institution/ Individual that raised the issues
6	• She was aware that in the newly developed district development plan, the district office put forth a request for more initiatives to help solve the challenge of inadequate potable water. Among those requested initiatives was the idea to tap water from the Shire River at Liwonde and pipe it to the areas of Balaka District. • On this proposed SRWB project, the lands officer is advising that issues of community sensitizations and compensations for loss of property (which is likely to occur) should be well prioritized to avoid or minimise possible disturbances to the project. She recommended that the best time to make assessments and recompenses for property to be affected, will be in the dry months of the year, where there are no crops grown by the people. The crops normally tend to make the compensations more expensive for the developer. • She also pointed out that there is a looming project by the National Roads Authority (NRA) in the near future to upgrade the Balaka-Liwonde Road along which the proposed distribution main line by the SRWB project will be	This has been highlighted in the ESMP	Ms. Violet Kamasumbi, District Lands Officer

No.	Main Issues raised	Response/ Method of incorporation in the ESIA Process	Institution/ Individual that raised the issues
	made to pass. She indicated that assessments for property to be affected by the project to upgrade the Balaka-Liwonde Road were already done. She also clarified that in a case where the Roads Authority project starts first before the SRWB project, the people will be compensated by the NRA and will not have to be compensated under the SRWB project. This will be the case since the two bodies of NRA and SRWB are both agencies of the Malawi Government and the procedures of the government do not allow for people to be "double recompensed" by the same Malawi Government for the same property lost. • Nevertheless, she pointed out that the compensation/resettlement procedures of the financier of the SRWB project will also have to be followed. • Concerning their work of valuating affected property as district lands office, she pointed out that they work hand in hand with the valuation section from the Southern Region head office for the Ministry of Lands, Housing and Urban Development. In their work as a district office, they mainly valuate trees and crops to be lost, while staff from the Southern Region		

No.	Main Issues raised	Response/ Method of incorporation in the ESIA Process	Institution/ Individual that raised the issues
	head office do provide help with valuation of land and structures to be lost. • Another recommendation made by the district lands officer was in regards to the rates of compensations for loss of property, in which she indicated that they ought to be equal to or higher than the standard Malawi Government rates for compensations. • On possibilities of having some vulnerable people that could be affected (through property loss) by the proposed SRWB project; she indicated that it is indeed likely that some vulnerable people will be found in the project area particularly those that would be relying on small grocery shops as their only livelihood source, as well as some female headed and child headed homes. Nevertheless, considering the fact that the most of the construction work under the SRWB project will be along a road reserve area, she indicated that the possible numbers of vulnerable families to be affected may not be as much. • Furthermore, she made mention of the recommendation that adequate community sensitizations would be		

No.	Main Issues raised	Response/ Method of incorporation in the ESIA Process	Institution/ Individual that raised the issues
	important for smooth project implementation. She also noted that it would help to minimise conflicts with the people despite the fact that this is a project that is already meant to give the much needed potable water to the communities. • Concerning the matter of community of sensitizations, she made mention that there would be need for the SRWB to hold sensitization meetings with the district council, the district executive committee as well as the local communities in the project area. • **She further gave insight picture of the sensitization meetings, stating that:** The sensitization meetings with local communities in the project area would take about 4-5 days. The district executive committee sensitization meeting (which should come before sensitizing the locals) would involve about 50-60 people who will include district council officers, leaders from the civil society in the district as well as traditional leaders, including the two T/As of Msamala and Kapalamula. The district council officers to be involved in sensitizing the		

No.	Main Issues raised	Response/ Method of incorporation in the ESIA Process	Institution/ Individual that raised the issues
	local communities would include the district commissioner, director of planning and development, the district commissioner, director of planning and development, as well as officers responsible for water development, HIV/nutrition, Gender, Community development, Land as well as Environment.		
7	• The proposed project to supply water to the town of Balaka from Liwonde, will greatly help solve the water woes that are being faced by the residents of Balaka Town. • The Environmental Health Officer related how the piped water shortages became a serious problem especially last year between the months of September and December. The intermittent water supply being primarily caused by the drying up of the source (Mpira Dam) resulted in communities standing in long queues through the night to fetch water from boreholes. The quality of water from the boreholes was too salty as is normally the case with most borehole water in areas around the town. Therefore, the Health Officer generally expects that the project will have a	This has been highlighted in the ESMP	Ms. Ireen Taombe, Environmental Health Officer responsible for sanitation and waste management

No.	Main Issues raised	Response/ Method of incorporation in the ESIA Process	Institution/ Individual that raised the issues
	number of positive impacts on the communities, mainly in the provision of the needed potable water and promotion of good hygiene among the people. • The only negative impacts she anticipates from this project include possible loss of natural resources like trees, and vegetation as well as possible spread of sexually transmitted diseases and sexual abuse of local women as they may be forced to trade sex for job opportunities on the project. • The project should include training of the workers to protect the environment by avoiding unnecessary land clearing etc. • The project should ensure that the workers are provided with all the necessary protective equipment during all their construction works. • There should be the provision of adequate first aid kits and fire extinguishers at all the project work sites as may be needed. • The workers should be trained on prevention of HIV and AIDS spread and they should be supplied with free condoms. • At all the project work sites, there should also be provision of adequate sanitation facilities, hand		

No.	Main Issues raised	Response/ Method of incorporation in the ESIA Process	Institution/ Individual that raised the issues
	washing facilities as well as safe drinking water. Her recommendation on temporary sanitation facilities at construction sites is that they should be VIP latrines provided with drop-hole covers. • Safe drinking water at construction sites should be provided in closed buckets fitted with a tap which can be opened to draw the water. • Waste collected at all work sites should be disposed in waste collection bins to be strategically placed and once the bins are full, the waste should be disposed of at the waste disposal site for the council located at Sosola near the Balaka Boma. • The Environmental Health Officer also indicated that the Balaka District Council has two tractors which provide waste collection services to areas within the Balaka Town. However, one of the tractors has issues and only one collects waste from specific points around the town to dispose at the Sosola dump site. The waste collection frequency for the council is daily with three to four trips per day. • Also, the officer pointed out that the Sosola waste disposal site also receives sewage sludge emptied from pit latrines and septic		

No.	Main Issues raised	Response/ Method of incorporation in the ESIA Process	Institution/ Individual that raised the issues
	tanks from households and commercial/institutional places from around the town. According to the officer, the Balaka District Council does not currently have their own working tanker for emptying and transporting sewage sludge. At the moment, customers from Balaka Town (who require sludge emptying services) are hiring tankers from private operators as well as the Machinga District Council at Liwonde Town.		
	• The project will contribute to the improvement of sanitation in the project area and also contribute to the socio-economic growth both locally and nationally. • Improved potable water supply will have a positive impact on the socio-economic growth of the two towns as the population growth rates in both towns are high and hence, there is great need of increased and reliable supply of potable water in the area. • The interviewee anticipates that young girls and women are more likely to be negatively impacted as they are prone to be exploited by project workers. Need to develop a code of conduct for the Contractor to ensure s/he signs it so that s/he fully	All issues are incorporated in the ESIA report	Paul Muhosha (District Forestry Officer) – Tel: 0999381294 | Dumisani Moyo (Total Land Care Programmes Officer – Tel: 0992420025

No.	Main Issues raised	Response/ Method of incorporation in the ESIA Process	Institution/ Individual that raised the issues
	abides by the laws and regulations in it. • Employment Opportunities: Not hiring locals will likely lead to conflicts with the project team and client. Prioritize local skilled and non-skilled workers before sourcing from elsewhere. • Loss of property: Affected members of communities will need to be adequately compensated or offered other means of restoring and improving their livelihoods. Also, where possible, the project should at all costs avoid affecting the property of locals.		

Annex 3.4: Main issues raised by ADC Members in Machinga District

No.	Main Issues raised	Method of incorporation in the ESIA Process	Institution/Individual that raised the issue(s)
1	Members pointed out that the proposed project is very important as it would help solve water problems that people in the district and other surrounding districts face in regards to portable water.	The ESMP in the ESIA has incorporated these issues.	Members of ADC
2	Members also indicated that the project will contribute to the improvement of water sanitation and hygiene in the project area as water availability will be guaranteed.	The ESMP in the ESIA has incorporated these issues.	Members of ADC
3	Members requested that they should be involved in planting of trees in all disturbed areas by the project.	The ESMP in the ESIA has incorporated these issues.	Members of ADC
4	Members requested that the project should employ people within the project area and not taking people from outside only for those jobs that they cannot do.	The ESMP in the ESIA has incorporated these issues.	Members of ADC
5	The contractor should be willing to hear from the community when issues arise during construction works	The ESMP in the ESIA has incorporated these issues.	Members of ADC
6	The members also mentioned that where there is need for compensation it should be done in a transparent manner so that only those people deserving it benefit	The ESMP in the ESIA has incorporated these issues.	Members of ADC

Annex 3.5: Main issues raised by ADC Members in Balaka District

No.	Main Issues raised	Response/ Method of incorporation in the ESIA Process	Institution/ Individual that raised the issues
1	The members anticipate to benefit from this project since water problems will be a thing of the past.	The ESMP in the ESIA has incorporated these issues.	Members of ADC
2	Hiring locals is expected on the project personnel especially for the non-skilled kind of jobs.	The ESMP in the ESIA has incorporated these issues.	Members of ADC
3	The contractor should be able to resolve issues with the community when issues arise during construction works on plight of workers and other related project activities.	The ESMP in the ESIA has incorporated these issues.	Members of ADC
4	Members of communities emphasized the need to be adequately compensated on the loss of their property by the project.	The ESIA report has recommended on how to deal with issues of compensation.	Members of ADC
5	The local committee should be involved in Grievance Redress.	This has been incorporated in the ESIA report	Members of ADC
6	Members also indicated the need to sensitize members of the community on HIV/AIDS and other sexually transmitted diseases to protect the locals during the project implementation	This has been highlighted in the ESIA report.	Members of ADC

Annex 4: Fauna Species

Annex 4.1: Bird Species

Local Name	Scientific Name	National Status	IUCN Redlist
Richard's Pipit	*Anthus richardi*	Not Protected	Not Threatened
Grey Heron	*Ardea Cinerea*	Not Protected	Not Threatened
Hammerkop	*Scopus umbretta*	Not Protected	Not Threatened
Spotted Eagle Owl	*Bubo africanus*	Not Protected	Not Threatened
Burchel's Coucal	*Centropus superciliosus*	Not Protected	Not Threatened
Pied Kingfisher	*Ceryle rudis*	Not Protected	Not Threatened
Red-faced Cisticola	*Cisticola erthrops*	Not Protected	Not Threatened
Speckled Mousebird	*Colius striatus*	Not Protected	Not Threatened
White-breasted CuckooShrike	*Coracina pectoralis*	Not Protected	Not Threatened
Pied Crow	*Corvus albus*	Not Protected	Not Threatened
Heuglin Robin Chat	*Cossypha heuglini*	Not Protected	Not Threatened
Folk-tailed Drongo	*Dicrurus adsimilis*	Not Protected	Not Threatened
Yellow-billed Egret	*Egretta intermedia*	Not Protected	Not Threatened
Common Waxbill	*Estrilda astrild*	Not Protected	Not Threatened
Yellow-Rumped Bishop	*Euplectes capensis*	Not Protected	Not Threatened
Red Bishop	*Euplectes orix*	Not Protected	Not Threatened
African Fish Eagle	*Haliaeetus vocifer*	Not Protected	Not Threatened
Collared Sunbird	*Hedydipna collaris*	Not Protected	Not Threatened
Barn Swallow	*Hirundo rustica*	Not Protected	Not Threatened
Red-throated Twinspot	*Hypargos niveoguttatus*	Not Protected	Not Threatened
Blue-billed Fire Finch	*Lagonosticta lubricata*	Not Protected	Not Threatened
Little Bee Eater	*Merops pusillus*	Not Protected	Not Threatened
African pied Wagtail	*Motacilla aguimp*	Not Protected	Not Threatened
Helmeted Guinea Fowl	*Numida meleagris*	Not Protected	Not Threatened
House Sparrow	*Passer domesticus*	Not Protected	Not Threatened
Yellow-throated Petronia	*Petronia superciliaris*	Not Protected	Not Threatened
Tawny-flanked Prinia	*Prinia subflava*	Not Protected	Not Threatened
Black-eyed Bulbul	*Pycnonotus tricolor*	Not Protected	Not Threatened

Local Name	Scientific Name	National Status	IUCN Redlist
Red-billed Quelea	*Quelea quelea*	Not Protected	Not Threatened
African Pied Wagtail	*Motacilla aguimp*	Not Protected	Not Threatened
Yellow-fronted Canary	*Serinus mosambicus*	Not Protected	Not Threatened
Bronze Manikin	*Spermestes cucullata*	Not Protected	Not Threatened
Cape Turtle Dove	*Streptopelia capicola*	Not Protected	Not Threatened
Black-crowned Tchagra	*Tchagra senegalensis*	Not Protected	Not Threatened
African Paradise Flycatcher	*Terpsiphone viridis*	Not Protected	Not Threatened
Blue Spotted Wood Dove	*Turtur afer*	Not Protected	Not Threatened
Blue Waxbill	*Uraeginthus angolensis*	Not Protected	Not Threatened
White breasted Cormorant	*Phalacrocorax lucidus*	Not Protected	Not Threatened
Reed Cormorants	*Microcarbo africanus*	Not Protected	Not Threatened
Lilian's Lovebird	*Agapornis lilianae*	Protected	Threated

Annex 4.2: Mammals

Local Name	Scientific Name	National Status	IUCN Redlist
Wehlberg's fruit bat	*Epmophorus wehlbergi*	Not Protected	Not Threatened
Schreibers' long-fingered bat	*Miniopterus schreibersii*	Not Protected	Not Threatened
Bocage's hairy bat	*Myotis bocagii*	Not Protected	Not Threatened
Little free-tail bat	*Tadarida pumila*	Not Protected	Not Threatened
Lesser red-musk shrew	*Crocidura hirta*	Not Protected	Not Threatened
Four-toed elephant shrew	*Petrodromus tetradactylus*	Not Protected	Not Threatened
Elephant shrew	*Elephantulus fuscus*	Not Protected	Not Threatened
Sun squirrel	*Heliosciurus mutabilis*	Not Protected	Not Threatened
Silvery mole rat	*Heliophobius argenteocinereus*	Not Protected	Not Threatened
Porcupine	*Hystrix africae australis*	Not Protected	Not Threatened
Fat mouse	*Steatomys pratensis*	Not Protected	Not Threatened
Spiny mouse	*Acomys spinosissimus*	Not Protected	Not Threatened
Woodland mouse	*Grammomys dolichurus*	Not Protected	Not Threatened
Black rat	*Rattus rattus*	Not Protected	Not Threatened
African dormice	*Graphiurus microtis*	Not Protected	Not Threatened

Lander's horseshoe bat	*Rhinolophus landeri*	Not Protected	Not Threatened
Hyna	*Crocuta crocuta*	Not Protected	Not Threatened
Hare	*Lepu saxatilis*	Not Protected	Not Threatened

Annex 4.3: Reptiles

Local Name	Scienific Name	Natonal status	IUCN Redlist
African Python	*Python sebae*	Not Protected	Least Concern
Puff adder	*Bitis arietans*	Not Protected	Least Concern
Black Mamba	*Dendroaspis polylepis*	Not Protected	Least Concern
Green Water snake	*Philothamnus hoplogaster*	Not Protected	Least Concern
Stripe-bellied sand snake	*Psammophis subtaenjatus*	Not Protected	Least Concern
Variabe Skink	*Mabuya varia*	Not Protected	Least Concern
Cape dwarf gecko	*Lygodactylus capensis*	Not Protected	Least Concern
Yellow-throated Plated Lizard	*Gerrhosaurusy flavigularis*	Not Protected	Least Concern
Stripped Skink	*Mabuya striata*	Not Protected	Least Concern
Ground Agama	*Agama aculeata distanti*	Not Protected	Least Concern
Spitting cobra	*Naja nigricollis*	Not Protected	Least Concern
Nile Monitor	*Varanus niloticus*	Not Protected	Least Concern
Crocodile	*Crocodylus niloticus*	Not Protected	Least Concern

Annex 5: Key Staff for The Assignment

Name	Consulting Firm	Proposed Position and Qualification	Task Assigned
Kent Kafatia, R. Eng	Water, Waste and Environment Consultants (WWEC) Lilongwe	Team Leader; Master of Science Degree (MSc.) in Water and Waste Engineering, Bachelor of Science Degree (BSc.) in Chemical Engineering, and BSc. Degree in Engineering Post Graduate Diploma Advanced Certificate in Water and Environmental Management.	• Coordinating the whole assignment; • Conducting literature gathering and review; • Identification and evaluation of project impacts; • Conducting stakeholder consultations; • Determination of, and evaluation project impacts, enhancement and mitigation measures; • Analysis of proposed project alternatives basing on social impacts; • Preparation of Environmental and Social Management and Monitoring Plan; • Compilation of the ESIA report; • Providing quality assurance.
Itayi Nkhono	Water, Waste and Environment Consultants (WWEC) Lilongwe	Sociologist; MSc. Environmental Engineering and Sustainable Infrastructure; and BSc Honours Sociology	• Stakeholder mapping and analysis; • Designing data collection tools; • Conducting stakeholder consultations; • Conducting literature gathering and review; • Managing the household survey and leading and data analysis; and • Compiling socioeconomic and baseline information.
Vincent Msadala, PhD	Water, Waste and Environment Consultants (WWEC) Lilongwe	Water Resources Expert; Doctor of Philosophy (PhD) in Civil Engineering; MSc in Civil Engineering; and BSc in Civil Engineering	• Conducting stakeholder consultations; • Conducting a visual and physical surveys of flora, birds, reptiles and amphibians, animal/mammal; • Visual observation and physical assessment of the present ecological importance, sensitivity and state of terrestrial and aquatic biodiversity within the

Name	Consulting Firm	Proposed Position and Qualification	Task Assigned
			proposed project footprint and surrounding environs; • Investigating of flora and fauna relationship to project affected persons.
Jamestone Kamwendo	Water, Waste and Environment Consultants (WWEC) Lilongwe	Ecologist; MSc. Degree in Conservation Biology; and BSc. Degree - in Biology and minor Chemistry.	• Visual assessment and determination of impacts of the project on surface water sources and other water users downstream; • Recommend mitigation measures to the project impacts; • Recommend on project alternatives based on project impacts, water resource assessment; and • Assist in the preparation of ESIA.
Rex Montgomery Kanjedza	Hydrogeo-Env Consultants, P.O. Box 30533, Lilongwe 3	MSc (Env); BEd(Chemistry)	• Incorporation of comments from MEPA; • Conducting consultations with key stakeholders.
Potiphar Kaliba(PhD)	Hydrogeo-Env Consultants, P.O. Box 30533, Lilongwe 3	PhD (Conservation Biology); MSc (Conservation Biology); BEd(Biology)	• Incorporation of comments from MEPA; • Conducting consultations with key stakeholders.