

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF FINANCE AND ECONOMIC AFFAIRS



MILLENNIUM CHALLENGE ACCOUNT - TANZANIA

CONSTRUCTION OF NEW LOWER RUVU WATER PIPELINE

Environmental Impact Statement

FINAL REPORT

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LIST OF ABBREVIATIONS

BP	World Bank Procedures
DAWASA	Dar es Salaam Water and Sewerage Authority
DAWASCO	Dar es Salaam Water and Sewerage Corporation
DN	Nominal Diameter
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
ESMP	Environmental and Social Management Plan
HIV/AIDS	Human Immune Deficiency Virus / Acquired Immune Deficiency Syndrome
JICA	Japan International Cooperation Agency
LGA	Local Government Authority
LR WTP	Lower Ruvu Water Treatment plant
MCA-T	Millennium Challenge Account - Tanzania
MCC	Millennium Challenge Corporation
MLD	Million Litres per Day
NEMC	National Environment Management Council
NGO	Non Governmental Organization
OP	Operational Policy of the World Bank
RAP	Resettlement Action Plan
ROW	Right of Way
SIA	Social Impact Assessment
SMEC	Snowy Mountains Engineering Corporation
SONGAS	Songo Songo Gas
SPSS	Statistical Package for Social Sciences
TANESCO	Tanzania Electric Supply Company
TTCL	Tanzania Telephone Company Limited
VEO	Village Executive Officer
WB	World Bank

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Finally, the EIA team would like to register its appreciation to Mr. G. Mango, Director General, National Land Use Planning Commission, for his valuable contributions, especially on matters related to land issues and consultation processes at the community level.

STUDY TEAM

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EXECUTIVE SUMMARY

The Government of the United Republic of Tanzania intends to expand the Lower Ruvu water supply system in order to improve supply to Dar es Salaam and surrounding areas. This involves (i) increasing the existing Lower Ruvu Water Treatment Plant (LR WTP) production capacity from 180 to 270 MLD, and (ii) increasing the carrying capacity of the 56.7 km pipeline between LR WTP and the main tanks near the University in Dar es Salaam. The LR WTP expansion is financed by the Millennium Challenge Corporation through the Millennium Challenge Account Tanzania (MCA-T). A separate EIA report was prepared and approved for these works.

This report addresses the environmental impact assessment (EIA) for the second activity, ie. increasing the carrying capacity of the pipe system which involves the construction of a second treated water transmission main. The alignment of the proposed pipeline will pass through Bagamoyo and Kinondoni Municipal Council districts, traversing eight villages and three urban wards.

The project is justified on the grounds that Dar es Salaam's water supply has not changed since it was constructed in the mid 1970s. Therefore the current demand exceeds supply by the considerable margin of approximately 200 MLD. DAWASA's long term plans involve expanding the LR WTP to its ultimate capacity of 360 MLD, and the proposed pipeline has been sized to accommodate this flow. In the immediate term, the additional volume of water produced by expanding the LR WTP and the pipeline system, will not only provide drinking water to more consumers, but will encourage investment, and will improve health and overall standard of living, all in accordance with the government's poverty alleviation strategy. The proposed new transmission main (NTM) will be a DN 1800 steel pipeline.

Following the MCC guidelines, and the policies and regulations of the Government of the United Republic Tanzania, related to environmental and social impact assessment, the baseline environmental and social environment has been determined, and the anticipated environmental and social impacts identified. Surveys and community consultation tools were used to gather information on impacts and mitigation measures.

Various pipeline routes were investigated with the intention of minimizing the extent of structure / property relocation and other compensation issues. This has been accomplished to a large extent, and the remaining issues are relatively minor and proportional to the scale of the project.

Although much of the proposed pipeline will be constructed within the existing DAWASA easement, additional lands will be required to extend the easement on one side. Such costs, in addition to other compensation costs, have been identified in the preliminary Resettlement Action Plan (RAP) which has been prepared part of these current studies. The final RAP will be prepared prior to commencement of construction.

The first 22 km of the proposed pipeline will pass through bush, designated reserve forest and agricultural fields. It will then run more or less parallel to the main Bagamoyo Road with minor deviations to avoid resettlement issues. The majority of the pipeline will be constructed within the existing DAWASA easement. However, in order to minimize compensation issues, the pipeline will be constructed within TANROADS right-of-way at 2 sections, and passes adjacent to the perimeter of the TWIGA Cement Factory at Wazo for a distance of about 4 km.

The proposed pipeline alignment passes through flat and undulating landscapes, dominated by scrubs, woodland and orchards, with some hardwood species of conservation value. The pipeline will cross four major seasonal rivers viz., Mpigi, Nyakasangwe, Tegeta and Mbezi Rivers, in addition to a few small seasonal streams. The project area is devoid of free ranging herbivore species, but has a variety of birdlife.

The two districts covered by the project area display poor health and demographic indicators, including the population to physician / health facility ratio, the number of water borne diseases, and the infant mortality rate. These social characteristics of the settlements in the project area suggest that providing enhanced water supply will have a bearing on the health of the population, including the more vulnerable groups such as women and children.

Social and environmental issues raised during the community consultations included providing continuous water supply, the safety of women, children and property during the construction period, noise and water pollution,

compensation and assistance for losses, awareness generation regarding HIV / AIDS, the use of local labour for the construction works, and inconveniences in terms of disruption to services and access.

Given the nature of the proposed project, the majority of impacts are short term, construction related impacts, including noise and dust pollution, vibration from construction equipment, disposal of wastes, erosion of soils, disturbance to existing water courses, removal of vegetation, disruption to vehicular and pedestrian traffic, site safety, disruption to property access, and disturbance of existing utilities and services. In general, these can be effectively eliminated or mitigated by adopting best practice engineering and construction methods. As such the contractor and construction supervisor will play key roles in ensuring that the Environmental and Social Management Plan is effectively implemented and monitored.

Construction of the pipeline will generate approximately 90,000m³ of excess excavated material. This can be easily disposal of within four potential areas which has been identified along the route. One of these disposal areas involves the upgrading of the existing maintenance excess track. The other three are disused quarries which can be rehabilitated back to their original condition.

The socio-economic impact identified the potential for land acquisition which will be linear in nature and have a limited impact on existing structures. However this impact can be largely eliminated at the pre-construction phase (i.e. during the detailed design) by careful selection of the pipeline route. Preliminary Resettlement Action Plan has been prepared to cover resettlement issues, as per the Terms of Reference. The EIA Report provided the base to understand the broad social issues of the area and focus of preparing the preliminary RAP. EIA and the Preliminary RAP will be executed by DAWASA. DAWASA will also be the internal monitor and will need to hire an independent agency to do the external monitoring. The operational phase of the pipe involves routine maintenance and repairs. However, the probability of failure (bursting of the pipe) can be reduced to acceptably low level through proper design to accommodate the design flows and pressures, and to ensure effective supervision during construction.

1 INTRODUCTION

1.1 Background

The Government of the United Republic of Tanzania intends to expand the Lower Ruvu water supply system, as part of its overall strategy to reduce poverty by improving and extending water supplies in the country. The existing Lower Ruvu water supply system, constructed in the mid 1970's, comprises the Lower Ruvu Water Treatment Plant (LR WTP), located approximately 60 km NW of Dar es Salaam, and a 56.7 km transmission main, which conveys the treated water to the University Terminal Reservoirs in Dar es Salaam. The location plan is provided in Figure 1-1 below. Figure 1-2 presents a detailed drawing showing the 13 sections of the entire pipeline stretch from LR WTP to the University reservoirs.

The existing Lower Ruvu water supply system provides approximately 70% of the treated water to Dar es Salaam and surrounding areas.

The overall improvement works comprises 2 main projects:

- i. Expand the production capacity of the LR WTP from 180 to 270 MLD; and
- ii. Increase the treated water transmission capacity between the LR WTP and Dar es Salaam. This involves the construction of a second transmission main to supplement the existing DN 1350 pre-stressed concrete pipeline.

The expansion of the LR WTP project is financed by the United States of America through the Millennium Challenge Account Tanzania (MCA-T) under the Ministry of Finance and Economic Affairs. In July 2009, *SMEC International (PTY) Limited* was retained to undertake studies, designs and prepare tender documents for the LR WTP expansion works. Part of the studies included an assessment of the capacity of the existing transmission main of nominal diameter 1350 mm (DN 1350). The study concluded that the pipeline was not capable of conveying the additional flow, and recommended the construction of a second pipeline.

The construction of a second treated water transmission main project is financed by the World Bank. In May 2010, *SMEC* was retained to undertake preliminary investigations, prepare an Environmental Impact Assessment (EIA) and preliminary resettlement plan, undertake detailed designs and prepare tender documents for the pipeline project.

A separate EIA report was previously prepared for the LR WTP expansion works (Item (i) above). NEMC issued the Environmental Impact Assessment Certificate on 2nd August 2010.¹

The current EIA is prepared for the second transmission main project (Item (ii) above).

Following the initial application accompanied by a Project Brief, and the subsequent Scoping Report, this EIA comprises the third and final step in the process that is managed by the National Environment Management Council (NEMC). According to the EIA regulation of 2005 GN No. 349 of 2005, the proposed activity is a water resources development project (Water Supply) and therefore falls under Type A project² that requires a mandatory Environmental Impact Assessment.

For the purpose of this document, the term "project" refers to Item (ii) above, ie the construction of a second transmission main.

1.2 Contractual Framework

MCA-T has entered into a contract with *SMEC International (Pty) Limited* to provide consulting services related to the design of a new large diameter treated water transmission pipeline between the Lower Ruvu Water Treatment Plant (LR WTP) and the University Terminal Reservoir in Dar es Salaam.

¹ Application Reference No. 1016 / Registration No. EC/EIS/290

² This categorization is based on Tanzanian Regulation. Type A project is a project that is likely to have significant adverse environmental impacts and that in-depth study is required to determine the scale, extent and significance of the impacts and to identify appropriate mitigation measures. Type B projects are those which are likely to cause some significant environmental impacts but the magnitude of the impacts are not well known. For Type B projects a Preliminary Environmental Assessment (PEA) is required to decide whether the project can proceed without a full EIA.

Specifically the services include field investigations, feasibility studies, detailed design, preparation of Tender Documents, and preparation of an Environmental Impact Assessment report and Preliminary Resettlement Action Plan (RAP).

The services contract was signed on 5th May 2010 and the studies commenced on 19th May 2010.

MCA-T also has an on-going Implementing Entity Agreement with DAWASA, the project proponent.

1.3 Preliminary Resettlement Action Plan

The Preliminary Resettlement Action Plan, as required by the Terms of Reference of the consulting services referred to in Section 1.2, is under preparation. The preliminary RAP is based on census and socio-economic survey of affected households and their assets, following finalization of the pipeline alignment, and consultations with persons affected by the project, and consultation with other stakeholders.

The preliminary RAP will capture issues pertaining to relocation of affected households, if any, and plan for the same. The preliminary RAP estimates the number and types of potentially affected persons, and provides preliminary cost estimates for resettlement, relocation and / or rehabilitation, based on estimated unit rates for different types of properties.

The preliminary RAP will consider the legal framework, the rights of people on land and eligibility for compensation, in line with World Bank safeguard policy OP 4.12. It will also provide a monitoring schedule and identify responsible parties.

The preliminary RAP will be finalized and implemented by the proponent prior to the commencement of construction. Compensation payments will be made using Government of Tanzania funds specifically allocated for the purpose.

1.4 Structure of the Report

The EIA Report is guided by the Terms of Reference, as agreed by NEMC, which is enclosed as Appendix 2. The report is structured as follows:

Executive Summary

Section 1	Presents the background to the project, contractual framework and the approach taken to undertake the study.
Section 2	Describes the project scope and project area, and provides justification for the proposed project
Section 3	Provides a description of the environmental and social baseline conditions, and profile of the sampled households
Section 4	Describes the national and international policy, legal and administrative framework within which the EIA study was carried out
Section 5	Describes the stakeholders and public consultations conducted, and outlines the main findings of the consultations;
Section 6	Discusses the project alternatives
Section 7	Describes the potential environmental and social impacts, and identifies mitigation measures
Section 8	Presents the Environmental and Social Management Plan (ESMP)
Section 9	Presents the Environmental and Social Monitoring Program\

Section 10	Decommissioning
Section 11	Presents Summary and conclusions

1.5 Study Approach

1.5.1 Objectives of the EIA

The Environmental Impact Assessment was conducted in fulfillment of the Tanzanian policy and legal requirements. The overall scope of this assignment comprises the preparation of an environmental and social impact assessment and preparation of an Environmental and Social Management Plan (ESMP).

Environmental Impact Assessment is a detailed process involving a number of interrelated steps. Consultations with stakeholders, and the establishment of baseline data, raise environmental and social issues that subsequently form the basis of the management and monitoring plans

The overall objective of the EIA is to ensure that adverse environmental and social impacts arising from the construction of the pipeline are identified and either eliminated or minimized to acceptable levels. The EIA also provides mitigation measures to the identified impacts, and establishes a comprehensive monitoring and management plan.

Another major objective of the EIA process is to provide a mechanism for stakeholder participation and information dissemination.

The need to conduct an EIA study emanates from the requirements of the Government of Tanzania's environmental impacts and audit regulations of 2005, which stipulate that an environmental impact assessment shall be carried out for all projects that fall under the mandatory category. Moreover, the regulations stipulate that, as a minimum, the assessment process has to address the following:

- Describe the baseline environment of the relevant project area;
- Identify the anticipated environmental and social impacts of the project and the scale of the impacts;
- Identify and analyze alternatives to the proposed projects;
- Prepare mitigation measures to be taken during and after the implementation of the project; and
- Develop an environmental management plan with mechanisms for monitoring and evaluating the compliance and environmental performance.

1.5.2 Study Approach and Methodology

Various methods were used to obtain quantitative and qualitative data in order to prepare the EIA Report. The EIA team collected the necessary data from the secondary and primary sources, which were processed and analyzed. The primary data was collected from the field studies conducted by the EIA Team. Then entire approach was divided into 5 main parts:

- i. Review of documents
- ii. Application of participatory methodology
- iii. Transect walk
- iv. Household survey
- v. Data analysis.

1.5.3 Review of Documents

The EIA team reviewed secondary data / information, policies, regulatory frameworks and relevant legal documents. The documents and reports that were reviewed are presented in Table 2.1

TABLE 2.1 DOCUMENTS / REPORTS REVIEWED

Documents / Reports	
National Land Policy, 1995	The Public Health Act, 2008
National Environmental Policy, 1997	Occupational Health and Safety Act No. 5, 2003
National Water Policy, 2002	Land Act No. 4 and Village Land Act No.5, 1999
National Gender Policy, 1999	Industrial & Consumer Chemicals (Management and Control) Act, 2003
National Forest Policy	The workers Compensation Act, Cap 268
Tanzania Wildlife Policy, 1998	The Urban Planning Act No. 8 of 2007
National human Development Policy, 2000	National Conservation Strategy for Sustainable Development of 1995
National Employment Policy, 1990	National Adaptation Programme of Action (NAPA) of 2007
National Policy on HIV/AIDS	World Bank's Environment Assessment (OP 4.01, BP 4.01, GP 4.01)
Environment Management Act	World Bank's Involuntary Resettlement Policy (OP/BP 4.12)
The Environmental Impact Assessment and Audit Regulations, 2005	World Bank's Policy on Natural Habitat (OP/BP 4.04)
Water resources Management Act, 2009	National Environmental Action Plan (NEAP)
Water Supply and Sanitation Act No. 12 of 2009	The National Strategy for Growth and Reduction of Poverty, 2005
The Dar es Salaam Water and Sewerage Authority Act, Cap 273	District Reports of Bagamoyo and Kinnodoni Municipal Council Districts

1.5.4 Application of Participatory Methodology

A participatory approach was adopted during the EIA study. The EIA Team contacted the elected representatives and local people in villages/wards and organized interactive sessions in the form of public meetings and focus group discussion with women. These meetings were held to identify key issues pertaining to the proposed project, including perceptions and attitudes of the communities. Consultations were also made with ward governments and representatives of communities at local levels. The consultative process also included meetings with DAWASA, TANESCO, TANROADS, Ministry of Land, Ministry of Environment and the district officials of Bagamoyo and Kinondoni Municipal Council. The complete process and results are summarized in Section 5 of this Report.

1.5.5 Transect Walk

The EIA team undertook a transect walk along the pipeline corridor. This exercise was carried out in order to identify the types of areas existing along the corridor, the likely nature of environmental and social issues, and identify the major environmental and socially sensitive receptors. The transect walk was undertaken along with village and ward representatives, and some of the household members living adjacent to the pipeline corridor.

The Consultant identified the villages and wards through which the pipeline will pass through and subsequently contacted the village and ward representatives in person, and fixed the dates for transect walks. During this process, the team also interviewed ward and sub-ward officials en route. This is covered further in Section 5 of this Report.

1.5.6 Household Survey

Household surveys were conducted on the people living in / near the water pipeline corridor, in order to capture the socio-economic profile and determine public attitudes, values and perceptions on a variety of issues. The survey was conducted between June and September 2010. The EIA team prepared structured questionnaires for conducting the socio-economic surveys. The questionnaire is enclosed as Appendix 1.

In order to assess various social impacts along the pipeline corridor, the household survey was planned using the sampling frame. The sample households were randomly selected, keeping the concentration of households and accessibility of the locations in mind. The sampling frame is provided in Table 2.2. The universe comprised households on both sides of the pipeline.

TABLE 2.2 SAMPLE OF HOUSEHOLDS FOR SOCIO-ECONOMIC SURVEY

Village / Sub-ward	Population	No. Households (Structures) Along Pipeline	Sample Households
Kongo	2251	40	3
Zinga	3648	Chamangwe forest / ZICO farm	-
Kerege	2101	6	5
Mapinga	4251	12	4
Bunju `A`	6,240	8	5
Boko	40,000	34	9
Tegeta	6,000	30	11
Salasala	5,400	57	14
TOTAL	69,891	187	51

Note: Populations of Bunju A, Boko, Tegeta and Salalsala are estimates only, as reported by the sub-ward representatives

Source: National Bureau of Statistics, 2002, Ward representatives and Transect Walk findings

The sample households selected for survey are located in Mbezi, Salasala, Tegeta, Boko, Bunju, Mapinga and other locations in Bagamoyo District. A total of 51 households were surveyed and the findings are presented in Section 3.4 of this Report.

The sample size was targeted to be approximately 10% of the structures occupied by households or to a minimum of 5 respondents in each village/sub-ward of the project corridor. However, due to the non-availability of respondents percentage of respondents is lower than the targeted 10% in Kongo. The percentage of respondent is greater in Kerege village due to the lower limit of at least 5 respondents. A questionnaire was prepared and used for collecting primary information about villages and sub-wards, social services, main economic activities, land use and views of the community regarding the proposed water pipeline.

1.5.7 Data Analysis

Data collected from secondary sources, household surveys and public consultations were tabulated and analyzed. The analysis mainly related to the identification of potential environmental and social impacts due to the proposed project, preparation of a socio-economic profile of the project corridor, and also of the potentially affected households. The impact assessment led to the categorization of the project and also provided basis for preparing the management and monitoring plans.

1.6 Assessing the Impacts

The following section describes the manner in which each impact is classified and assessed.

1.6.1 Categorizing the Environmental and Social Resources and Receptors

The potential impacts are classified as affecting one or more of the following resources and receptors:

Physical

Within the context of the proposed project, the physical resources and receptors include surface and ground water systems, soils and other sub-surface resources, and air quality

Biological / Ecological

The biological / ecological resources and receptors include the various flora and fauna present within the project area.

Economic Activity

Within the context of the proposed project, the activities are assessed in terms of their potential impact on the existing economic environment. This may include job creation, increase in level of economic activity, as well as disruption to businesses due to project activities.

Social and Cultural

The project activities are assessed in terms of their potential impact on the existing social and cultural environment. This may include resources such as schools, graveyards, religious centres, hospitals / clinics etc. In addition, this may include existing infrastructure, utilities and services which are part of the overall social environment.

1.6.2 Direct and Indirect Impacts

Impacts are further classified as being either direct or indirect.

Direct impacts are those occurring at the same time and the same location where the project activity takes place. An example would be noise levels at the work site resulting from operation of contractor's equipment.

Indirect impacts are those generally occurring at a later time and/or at a more remote location from the project site. An example may include increased economic investment resulting from increased availability of water.

1.6.3 Magnitude of Impact

The magnitude of an impact takes into consideration both the extent of the impact (eg. local, regional, etc), as well as the anticipated size, or scale, of the impact.

The magnitude is classified as follows:

- Low* - Localized and relatively small scale impacts;
- Medium* - Sub-Regional and moderate impacts;
- High* - Regional and relatively large scale impacts.

1.6.4 Duration and Frequency

The duration and frequency of an impact considers both the length of time the impact is expected to prevail, as well as the likely frequency that the impact is expected to occur.

For example, during construction, an impact may be a one-off occurrence, or may occur repeatedly throughout the course of the construction works. Likewise the duration of the impact may be brief (for example the singular noise associated with blasting of rock), or it may be more or less continuous during daylight hours (eg. the noise associated with the operation of a mechanical excavator).

The duration and frequency are classified as follows:

- Low* - Relatively short term, low frequency events;
Medium - Medium term, medium frequency events;
High - Relatively long term, high frequency events.

1.6.5 Temporary or Permanent

Impacts are also categorized in terms of their permanency.

Temporary and permanent impacts are classified as follows:

- Temporary* - Shorter term and generally reversible (where short term may include the period of construction, i.e. 1-2 years);
Permanent - Longer term, and may be reversible or irreversible.

1.6.6 Sensitivity

The sensitivity of an impact reflects the fragility and adaptability of the receptor.

The degree of sensitivity is classified as follows:

- Low* - Highly adaptable, non-fragile systems, minor effects;
Medium - Adaptable, predictable outcome, modest effects;
High - Low adaptability, fragile systems, unknown effects.

1.6.7 Probability

The probability of the impact reflects the likelihood of the impact occurring. For example, the probability of localized noise occurring due to operation of the Contractors plant and equipment is High, ie it will almost certainly happen.

Probability is classified as follows:

- Low* - Highly unlikely chance of occurrence;
Medium - Likely chance of occurrence;
High - Highly probable chance of occurrence, or certain.

1.6.8 Potential for Mitigation

The potential for applying mitigating measures to an impact reflects the likely level of effort required and the availability of appropriate measures that can be adopted.

The potential for mitigation is classified as follows:

- Low* - Low (or zero) potential for mitigation (i.e., there are no mitigation measures available), and typically involve high cost measures;
Medium - Moderate potential, and generally involves moderate effort;
High - High potential, and generally involves relatively minor, low cost effort.

1.7 The EIA Team

The Consultant's EIA study team consisted of the experts who were originally presented in the Consultant's Proposal and accepted by the Client. The team members were given the responsibility for conducting the EIA and preparing the draft and final reports. The team members included:

- i. Dr. Wilfred Nyerere Sarunday Environmentalist and EIA study Team Leader
- ii. Mr. Abubakar Salum Rajabu Sociologist

1.8 Assumptions

This study report has been compiled with the assumption that the information provided by stakeholders and key informants at Ministerial level, organization, and District, Ward and Village levels is accurate and reflects the situation existing within the project area. It is also assumed that the opinions and aspirations of communities were correctly represented. Further, it is assumed that DAWASA (the Proponent), and other government agencies, have adequate technical and financial capacity to effectively implement the proposed Environmental and Social Management Plan (ESMP) and monitoring plan.

2 PROJECT DESCRIPTION AND JUSTIFICATION

2.1 General Description and Scope of the Project

This project, which is estimated to cost about US \$ 90 million, involves the construction of a second treated water transmission main between the LR WTP and University Terminal Reservoirs in Dar es Salaam. In general, the proposed pipe will run parallel to the existing DN 1350 pre-stressed concrete pipeline which is approximately 56.7km long. The final diameter of the proposed pipe will be determined during the detailed design phase of the studies. However, preliminary design indicates that the pipeline diameter will be approximately DN 1800. For a pipe of this size, the most likely material of construction is high grade steel with a suitable protective coating and lining against corrosion.

Specifically the proposed works include:

- Construction of approximately 56.7 km of underground DN 1800 pipe and fittings;
- Installation of pipeline appurtenances including air valves, isolation valves, and washouts;
- Construction of reinforced concrete chambers to contain and protect the pipeline appurtenances; and
- Installation of surge protection facilities

2.2 Location and Project Area

2.2.1 General

The project area essentially comprises a long and narrow corridor, commencing at the existing LR WTP and extending along the route of the proposed pipeline (which is approximately parallel to the existing pipeline), and terminating at the University Terminal Reservoirs in Dar es Salaam.

The project site is located in sections of Bagamoyo District (within the Coast Region) and Kinondoni Municipal Council District (within Dar es Salaam Region). The town of Bagamoyo is located approximately 75 km north of Dar-es-Salaam on the coast of the Indian Ocean.

A general location plan is provided in Figure 2.1.

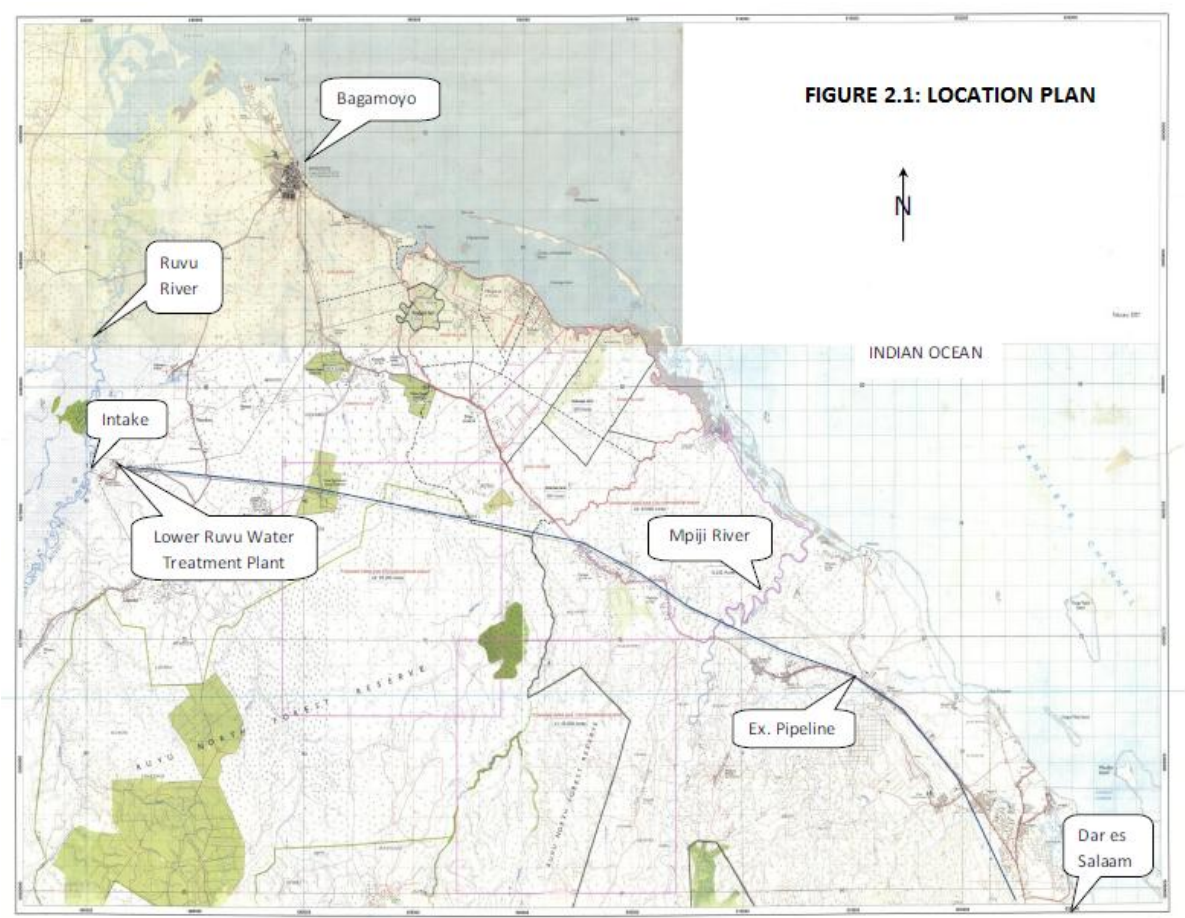
Plans of Bagamoyo District and Kinondoni Municipal Council are provided in Figure 2.2 and Figure 2.3 respectively.

A plan of the project area and pipelines is provided in Figure 2.4.

Topographically, the project area covers areas of lands in a coastal belt zone, ranging from 0 to 65 meters above sea level.

The pipeline crosses 4 moderately sized, but seasonal rivers, namely the Mpiji River, Nyakasangwe River, Tegeta River and Mbezi River.

For the purpose of this study, the project area has been split into various sub-sections. The sub-sections are described in Table 2.1 and shown in Figure 2.4.



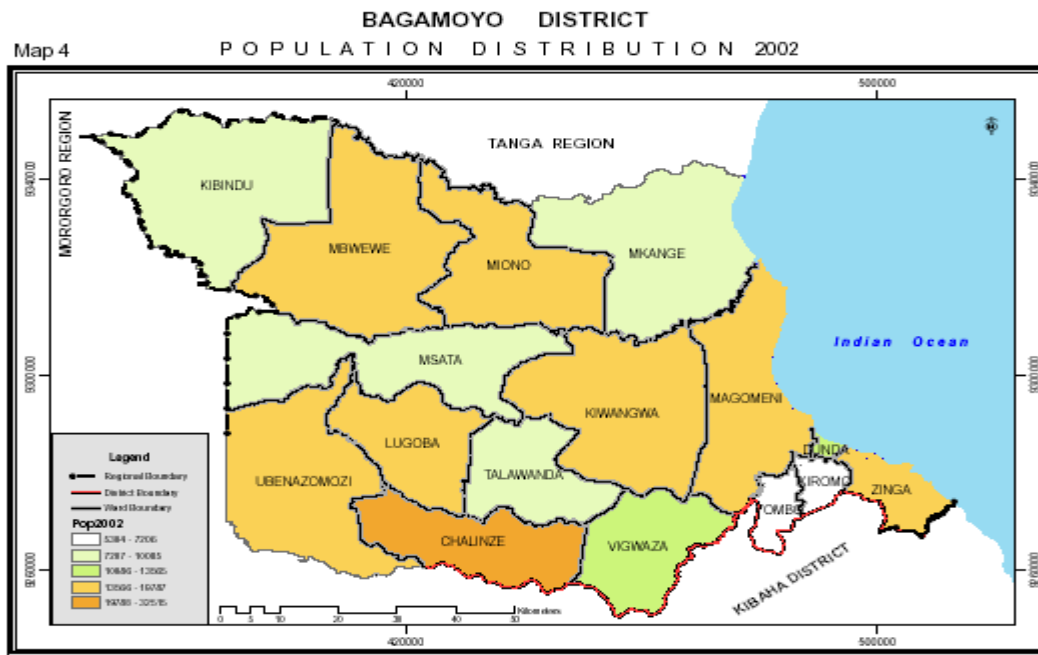


Fig. 2.2: BAGAMOYO DISTRICT

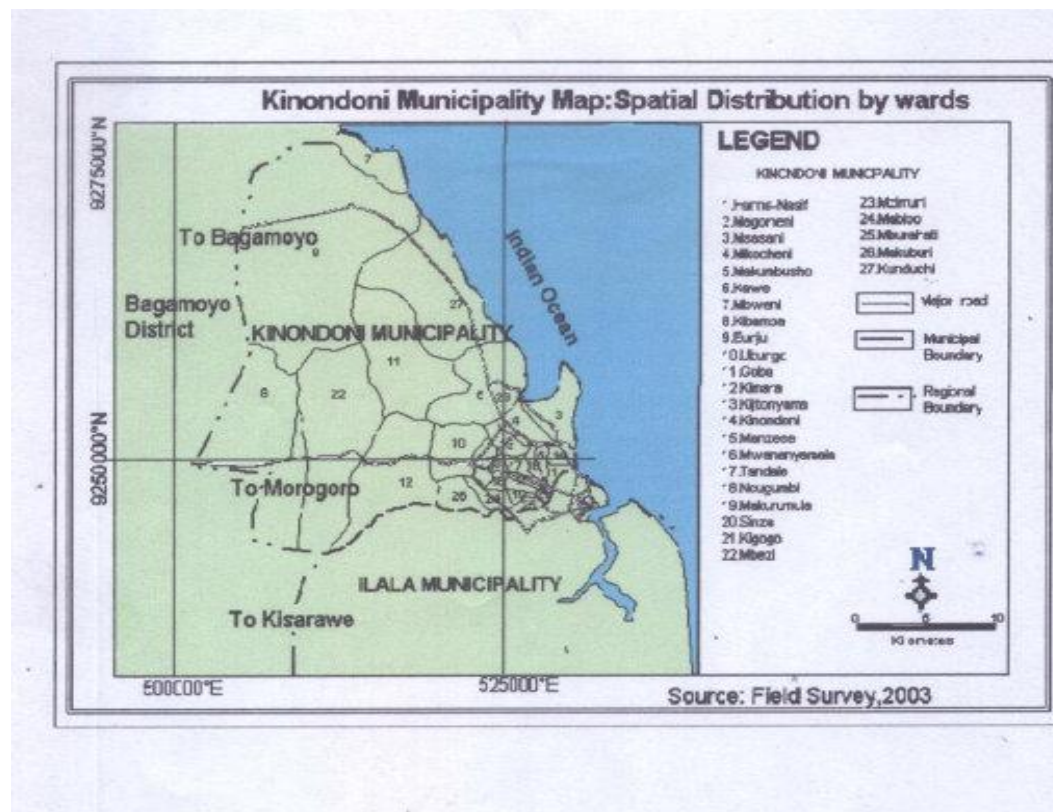


Fig. 2.3 KINONDONI MUNICIPALITY

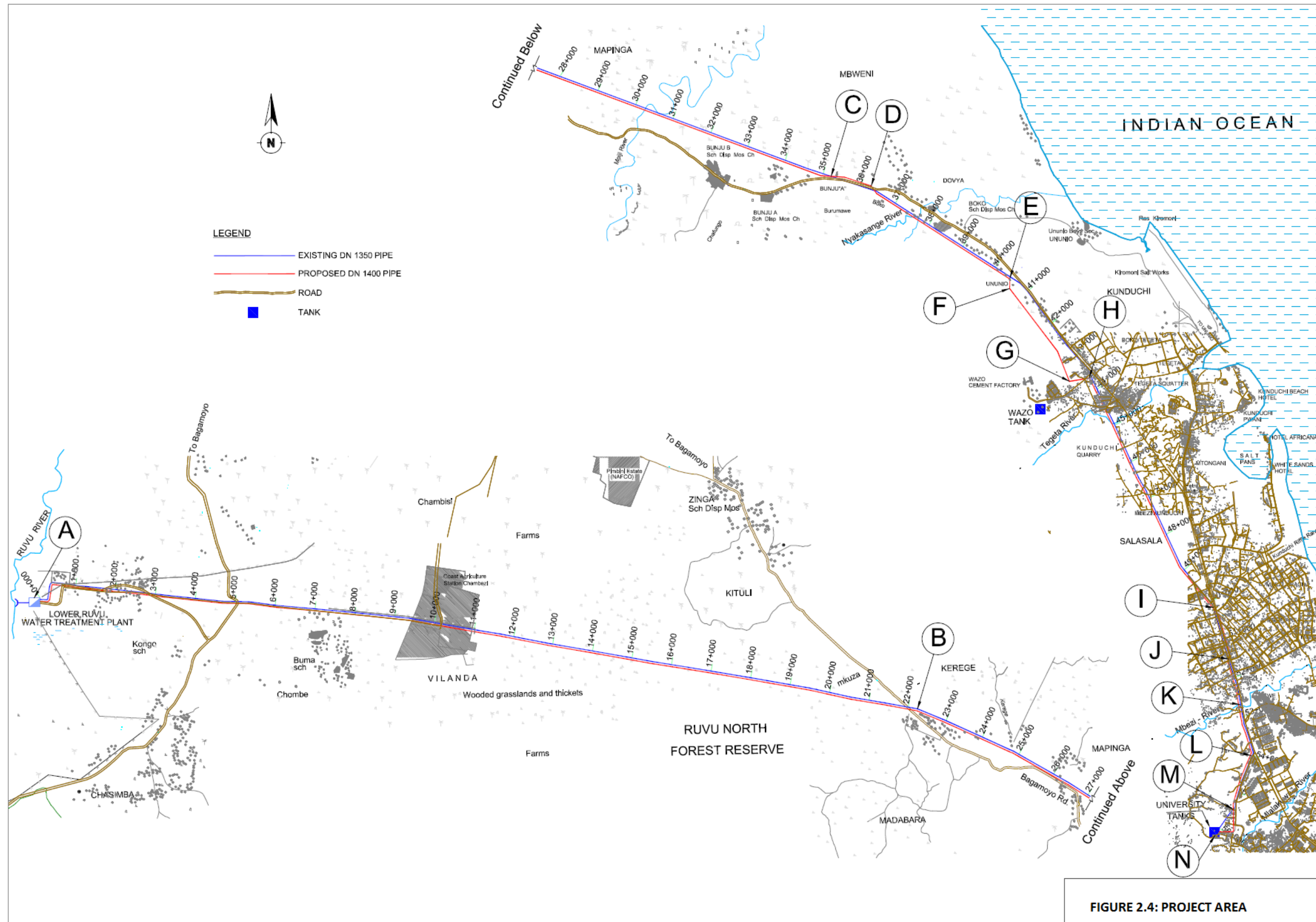


TABLE 2-1 SUB-SECTIONS OF PROJECT AREA

Section	From	To	Length (km)
A-B	WTP	Kerege	22
B-C	Kerege	Bunju A Junction	13
C-D	Bunju A Junction	Road Crossing (Bagamoyo Rd)	1.5
D-E	Road Crossing (Bagamoyo Rd)	School	4.1
E-F	School	Cement Factory (North end)	0.3
F-G	Cement Factory (North end)	Cement Factory (South end)	2.8
G-H	Cement Factory (South end)	Wazo Hill Road	0.6
H-I	Wazo Hill Road	Interchick	6.8
I-J	Interchick	Road Crossing (Bagamoyo Rd)	1.2
J-K	Road Crossing (Bagamoyo Rd)	Mbezi River	1.1
K-L	Mbezi River	Turn-off from Bagamoyo Rd	1.5
L-M	Turn-off from Bagamoyo Rd	700m before University Tanks	1.1
M-N	700m before University Tanks	University Tanks	0.7
			56.7

2.2.2 Existing Pipeline and Easement

The existing DN 1350 pre-stressed concrete pipeline route passes through open bush for the first 22 km from the LR WTP until it reaches Bagamoyo Road. Thereafter, it runs more or less parallel with the road, although on different sides at different locations where it crosses a road until it turns south-west toward the University Terminal Reservoirs.

The existing pipeline is located within TANROADS right-of-way (ROW) at several locations, including:

- Approximately 1.5 km section near Bunju A;
- Approximately 3.5 km section at Boko; and
- Approximately 5 km section south of Interchick factory, including a section within Lugalo Barracks lands.

The existing pipeline has associated with it an easement which extends from the LR WTP to the University Terminal Reservoirs. This easement grants DAWASA, and its operator DAWASCO, the right to enter the lands for the purpose of operation and maintenance of the pipeline.

It is proposed that, wherever possible, the second pipeline shall be constructed within the existing easement in order to minimize compensation issues.

2.3 Project Phases

The project has two distinct phases:

- i. The construction phase
- ii. The operational phase.

2.3.1 Construction Phase

Main Activities

The sequence of activities to be carried out during the construction phase includes:

i. Setting out pipeline route

A surveyor will first establish a series of benchmarks along the route of the pipeline. The route of the pipeline shall then be pegged at 100m intervals and at all bends.

ii. Supply of Pipes

Pipes shall and valves shall be transported to the site by flat bedded trucks from their place of manufacture's premises. The pipes and valves shall be inspected upon arrival for damage. Any defective pipes shall be repaired or replaced. The pipes shall be offloaded from the truck by crane and temporarily stored in storage areas along the route of the pipeline for future installation.

iii. Clearing and stripping topsoil

The route of the pipeline shall be cleared of all vegetation and trees.

The topsoil along the route of the pipeline shall then be stripped by a grader and stockpiled along the pipelines route for future re-use. The width and depth of the stripping will be 5000mm and 100mm respectively.

iv. Excavate the trench and prepare the bedding for the pipe

Excavations of the pipe trench shall be by the open cut method. The width of the trench for the 1800mm steel pipeline will be 2700mm. The depth of the trench will vary between 3000 to 5000mm. The excavated material shall be stockpiled beside the trench for later backfilling or disposal.

v. Install the pipe;

Lower bedding material shall be placed on the floor of the trench and levelled to the correct height. The pipes shall be lowered into the trench by a crane. The pipes shall be joined by welded them together.

vi. Place and compact backfill material in trench

Embedment material shall be brought by the local supplier and stockpiled along the route of the pipeline. The embedment material shall be placed in layers to the sides of the pipe by a backhoe. It shall be compacted by a vibratory plate to achieve a height of 300mm above the crown of the pipe. The bedding material will consist of sand and coarse grained soil. The total volume of embedment material will be approximately 200,000 m³.

vii. Reinstate all disturbed surfaces

The main backfill shall be fill material previously excavated from the trench and stockpiled along the pipe trench. Any rocks larger than 100mm shall be removed from this material. The material shall be placed in 150mm layers and compacted using approved mechanical tampers.

Road crossings shall be reinstated to their pre existing condition to the requirements of the relevant Authority and to the approval of the Engineer.

viii. River Crossings

River crossing shall be constructed during dry periods. In situations where there are some low flows the river will be sand bagged or coffer dammed off both upstream and downstream of the propped crossing. A pump will be used to divert any flows passed the pipeline excavation. Sediment traps will be installed to prevent any pollution of the river.\

ix. Install isolation valves, washouts and air valves;

Air valves will be installed along the route of the pipeline at all high points and at a maximum interval of 800m. Washouts will be installed at all low points. Isolation valves will be installed along the route of the pipeline to allow for future maintenance.

x. Hydrostatic testing

The new pipeline shall be hydrostatically tested to ensure that it is to ensure that it is water tight and does not leak. The pipeline shall be slowly filled with water and pressurised by a pump to its test pressure. After a set period the test pressure shall be recorded and sufficient water again pumped into the line to bring the pipeline back to the test pressure. This procedure is repeated for three hours. The leakage rate is determined compared to the allowable amount. Any leakages exceeding the permissible amount shall be made good and any faulty pipes or valves replaced.

Construction Materials

The construction materials, including estimated quantities and likely sources, are shown in Table 2.2

TABLE 2-2 ESTIMATED QUANTITIES OF CONSTRUCTION MATERIALS AND SOURCES

Material / Equipment	Est. Qty	Unit	Likely Source
Pipe, fittings and pipe couplings			
Pipe, DN 1800	55,200	m	Local steel pipe supplier or international supplier
Couplings, DN 1800	50	Nr	Local steel pipe supplier or international supplier
Connection pipe work, DN1200	50	m	International supplier
Isolation valves, DN 1500	2	Nr	International supplier
Isolation valves, DN 1500	20	Nr	International supplier
Washout valves, DN 300 and DN 450	30	Nr	International supplier
Air valves, DN 200	83	Nr	International supplier
Reinforced concrete chambers			
Cement	5,400	Bags	Local supplier
Coarse Aggregate	600	m ³	Local supplier
Fine Aggregate	300	m ³	Local supplier
Water	140	m ³	Local supplier
Steel Reinforcement	150	MT	Local supplier

Construction Equipment

The Contractor's plant and equipment will include the following items:

Mechanical excavators / loaders;

- Mobile cranes;
- Compactors / rollers;
- Trucks for material haulage;
- Concrete mixers / vibrators;
- Welding machines;
- Pressure testing equipment;
- Dewatering pumps;
- Pick-up trucks; and
- Miscellaneous small hand tools

Temporary Structures

Temporary structures used by the Contractor during the construction works may include:

The Contractor will provide two site offices for the project. The location of these offices is unknown at this stage. However, the main site office is likely to be located in Dar es Salaam. A secondary site office is likely to be located at a strategic location half way along the pipeline such as at Kerege. Both of these offices are likely to be rented and be fully equipped with telephones, eating facilities, showers and toilets. Both these offices will be equipped with septic tanks.

The offices should also be equipped with the following:

- Kitchen areas / Mess huts,
- Stores and lay-down areas,
- Main yard for maintaining plant and equipment, and bending of reinforcement (this will likely be in the same location as the main office) and
- Portable toilet facilities.

Generation of Wastes

Wastes generated during the construction phase of the project will include:

- Approximately 3 m³ of sanitary wastes generated by the workers; and
- Approximately 90,000 m³ excess excavated materials.

Excess construction materials. Given the nature of the works, it is anticipated that this quantity will be minimal. All excess materials will be removed from site by the Contractor for future use.

2.4 Potential sites for the disposal of spoil

SMEC has identified four potential spoil disposal sites along the route of the NTM. Details of each site are provided below.

Between the LR WTP and Bagamoyo Road.

There is an existing maintenance access track adjacent to the ETM. This track is in a poor condition and inaccessible in places during wet periods. The track is generally located within the existing pipeline easement.

Access spoil from the pipeline trench could be used to re-grade the track and also to raise it slightly above the existing ground level. This will improve its drainage and make it more accessible particularly during wet periods.

The area has already been disturbed and there will be no impacts to the environment. Approximately 10,000 cubic meters of spoil can be disposed of along the length of the access track.



**Plate 1: Existing access track between LR WTP and Bogamoyo Road
Kerege old Quarry site**

The Old Kerege Quarry which is located close to the Dar es Salaam Bagamoyo Road was used to obtain fill for its construction. The quarry is approximately 100m long by 50m wide and up to 10 - 15m deep in places. The quarry is bordered to the north by the Marian Boys Secondary school Road and by the Bagamoyo – Dar es Salaam Road in the east. There are a number of scattered residential houses and a rough gravel road to the south and to the west.

The disused quarry is currently owned by the village government and consists of grasslands and contains a few scattered shrubs. The area has been substantially disturbed and contains no surface water pathways, wetlands or other environmental issues. The geology of the area is generally overlain by a variable thickness of reddish sandy-loam soils.

Approximately 50,000 cubic metres of spoil can be disposed of within the quarry. This would reinstate it back to its natural condition.



**Plate 2: Existing Layout of Kerege Old Quarry site seen from the West
Kunduchi Quarry site**

The Kunduchi Quarry is located in the Kunduchi, some 25km from Dar es Salaam City Centre, adjacent to the JKT Quarry Zone. It is bordered by the Dar es Salaam – Bagamoyo road on the west, residential zone in the east and other quarries to the north. This site is over 100 hectares in size and approximately 15m deep. It has more than sufficient capacity to dispose of all of excess spoiled from the trench excavation.

The topography of much of the area is hilly sloping toward the ocean and suggests that the likelihood of finding any wildlife, water source and re-vegetation is very low. In general, the quarry site is steep, and has been modified by past quarrying activities. This area is easily accessible by road and contains various internal haul roads.



**Plate 3: Existing layout of the Kunduchi Quarry site
Salasala Old Quarry Site**

This site is located in the Salasala area and is estimated to be approximately 400m long by 200m wide and 5m deep. It has an area of approximately 8 hectares and has more than sufficient capacity to dispose of all of excess spoil from the trench excavation.

The topography in the vicinity of the disused quarry is characterized by hilly, low-lying, generally undulating landscapes. A survey of the area indicated that the vegetation within the quarry site forms a mosaic of highly variable secondary habitats both in terms of their botanical value and their value as wildlife habitats. There is no wildlife of biological interest and no water sources in the vicinity. Access to the site is readily available.

The site has more than sufficient capacity to dispose of all the excess spoil from the trench excavation.



Plate 4: Old Salasala Quarry site

2.4.1 Operational Phase

Main activities

The main activities carried out during the operational phase include:

- Routine inspection and maintenance of the pipeline and appurtenances;
- Operation of washouts at periodic intervals in accordance with the operation and maintenance schedule;

- Exercising Valves and
- Pipeline repairs in case of pipe burst.

Materials

Materials used during the operational phase will include spares parts and replacement sections only.

Equipment

DAWASCO (DAWASA's water system operator) will provide all plant and equipment to be used during operations.

Generation of Wastes

The pipeline supplies treated water which will not generate any wastes. However, the pipeline contains washouts which will only be operated in the event of pipe breakage or for major maintenance. This will only be carried out rarely and at worst it may occur once in every 10 to 20 years. Many of the washouts will dispose of clean water into an existing river system. However, there are some washouts which do not drain to a river and this water can either be used to irrigate the adjacent lands or be transported to a river.

2.5 Households and Investors Affected

There will be 277 households affected through loss of land or other assets by the construction of pipeline. There is a total of 1787 people directly affected by the project. More specific details of the people affected by the project are provided in Resettlement Action Plan (RAP) provided.

2.6 Project Justification

The Lower Ruvu Water Treatment Plant (LR WTP) was constructed in the mid-1970's with a production capacity of 180 million litres per day (180 MLD). The existing LR WTP currently provides approximately 70% of all potable water to Dar es Salaam, and therefore represents one of the major components in the water supply system as a whole. The remaining 30% is derived from the Upper Ruvu Water Treatment Plant, located approximately 25 km upstream of the LR WTP.

Neither of the two WTPs has been expanded beyond its original capacity. Meanwhile, the population of Dar es Salaam has continued to increase along with the associated demand for water. The result is that the current water demand far exceeds the supply. The estimated 2010 demand is 470 MLD (*Source: Development of a Strategic Water Supply Plan for Dar es Salaam – Water Supply Improvement Plan, Final Report, by Consultants AAW et al., June 2008*), whereas the current production capacity is approximately 270 MLD, a shortfall of 200 MLD.

In light of this significant shortfall in supply, DAWASA intends to expand the capacity of the LR WTP by 50% in the immediate future, increasing production capacity from 180 MLD to 270 MLD. These works will be carried out under the current Millennium Challenge Corporation (MCC) Compact.

However, the expanded WTP capacity cannot be utilized until the transmission system is upgraded. This involves:

- Increasing the pump capacity at the LR WTP. This will be carried out under the WTP expansion project; and
- Constructing a new (2nd) pipeline, between the LR WTP and the University storage tanks in Dar es Salaam, to supplement the existing pipeline.

In the future, following construction of a regulating dam at Kidunda, DAWASA will further expand the LR WTP to its ultimate capacity of 360 MLD. The proposed 2nd pipeline will be of sufficient capacity to carry the ultimate flow of 360 MLD.

Therefore, the proposed pipeline project is a key component of DAWASA's long term plans to improve water supply to Dar es Salaam and the surrounding towns. The project will not only provide an increased volume of safe water to a greater number of people, but will attract further economic investment, resulting in greater employment opportunities, and will also improve the overall health situation and contribute to poverty alleviation in general.

3 DESCRIPTION OF ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS

This section describes the baseline conditions as they relate to the physical environment, biological environment, the socio-economic environment along the pipeline corridor, and socio-economic profile of the sample households. The first three sub-sections are based on secondary data and observation, while the last sub-section is based on the primary survey.

3.1 Physical Environment

3.1.1 Topography

The topography of the project area varies from flat to undulating landscapes. The coastal areas are relatively flat stretching inland for a distance of about 2 to 10 kilometers from the coast, with hilly areas to the west and south (eg. Wazo Hill).

Most areas consist of slightly undulating topography with ridges interspaced by V-shape valleys that serve as water passageways during the rainy season.

Three ecological zones can be distinguished in the project area;

- i. An upland zone, comprising the hilly areas characterized by gently undulating to rolling topography (5-15% slope) with an altitude ranging between 80 to 100m;
- ii. Middle plateau; and
- iii. Low lands, including the low altitude coastal plains.

3.1.2 Geology and Soils

Generally the study area is characterized by metamorphic (Pre-cambrian) basement rock which consists mainly of Gneisses. In low depressions, the river valleys and the coastal plateau, the geological base consists of neogene, Kainozoic, sedimentary and metamorphic rocks.

There are four dominant soil types in the study area, namely Chromic Luvisols (deep Sandy) Albic Arenosols (sandy loam), Vertisols (clay) and Fluvisols (sandy loam and clay).

3.1.3 Meteorology and Climate

The project area lies in the coastal belt and experiences a modified type of equatorial climate which is generally hot and humid throughout the year, with an average temperature of 29°C. The hottest season is from October to March during which temperatures can reach 35°C. It is relatively cool between May and August; with temperatures around 25°C.

There are two main rainy seasons; a short rainy season from October to December and a long rainy season between March and May. The average rainfall is 1000 mm (lowest 800 mm and highest 1300 mm). Humidity is around 96% in the mornings and 67% in the afternoons. The climate is also influenced by the south-westerly monsoon winds from April to October and north-westerly monsoon winds between November and March.

3.1.4 Hydrology and Water Resources

The study area has four moderately sized rivers, namely the Mpji River, Nyakasangwe River, Tegeta River and Mbezi River, all discharging water into the Indian Ocean. The four rivers are reliable sources of water for domestic use, livestock and small holder irrigation during the rainy season. However, they have minimal flow or remain completely dry during the dry seasons.

3.2 Biological Environment

3.2.1 Vegetation

Generally, the study area is covered with a variety of vegetation including coastal savanna grasses, dense thickets interspaced with trees, open wooded grasslands and some denser thickets with palm-bush forming the ground cover.

The main section of the project area, downstream of the initial 22 km of woodland and scrubs, has been transformed into anthropogenic landscape after years of human activities. Some remnant forest pockets remain at Chambezi, Chamangwe, Zinga and Kerege, with important hardwood species of conservation value.

The dominant existing vegetation types in the built areas are exotic species interspersed with mangoes, cassava, coconut palms, orange trees, cashew nut trees and other crops.

There are no floral species of conservation significance identified along the proposed pipeline route. Further there are no protected areas or locations of ecological significance within the project area.

3.2.2 Fauna

The study area is devoid of free ranging herbivore species. However, there is a variety of birdlife

There are no endemic, rare or endangered wildlife species. Since biological importance is often assessed primarily based on rarity, endemism and biological significance of the biota available, this study area has low conservation significance.

The biophysical profile of the pipeline corridor is presented in Table 3.1

TABLE 3.1: BIOPHYSICAL PROFILE OF THE PIPELINE CORRIDOR

PIPELINE SECTION	LOCATION	PHYSICAL / BIOLOGICAL FEATURES
A – B	Kongo, Kiwete, Kerege	<ul style="list-style-type: none"> • Wooded grasslands & thickets • Ruvu North Forest Reserve • Scattered and cashew nut coconut tress • Birdlife
B – C	Mapinga Bunju B	<ul style="list-style-type: none"> • Anthropogenic landscape characterized with scattered tress, grasslands and no species of biological significance • Scattered and cashew nut coconut tress • Mpiji River
C – D	Bunju A	<ul style="list-style-type: none"> • Modified habitats
D – E	Boko	<ul style="list-style-type: none"> • Anthropogenic landscape • Scattered and cashew nut coconut tress • No wildlife of ecological significance • Nyakasangwe River
E – F	Boko	<ul style="list-style-type: none"> • Grassy undulating plains
F – G	Wazo	<ul style="list-style-type: none"> • Anthropogenic landscape • No wildlife of ecological significance
G – H	Wazo	<ul style="list-style-type: none"> • Anthropogenic landscape • No wildlife of ecological significance
H – I	Salasala	<ul style="list-style-type: none"> • Anthropogenic landscape

PIPELINE SECTION	LOCATION	PHYSICAL / BIOLOGICAL FEATURES
		<ul style="list-style-type: none"> • No wildlife of ecological significance • Tegeta River
I – J	Salasala	<ul style="list-style-type: none"> • Anthropogenic landscape • No wildlife of ecological significance
J – K	Mbezi	<ul style="list-style-type: none"> • Anthropogenic landscape • No wildlife of ecological significance
K – L	Mbezi	<ul style="list-style-type: none"> • Anthropogenic landscape • No wildlife of ecological significance • Mbezi River
L – M	Mbezi	<ul style="list-style-type: none"> • Anthropogenic landscape • No wildlife of ecological significance
M – N	Mbezi Bondeni	<ul style="list-style-type: none"> • Anthropogenic landscape • No wildlife of ecological significance

Note: Refer to Figure 3.4 for pipeline sections

3.3 Socio-Economic Environment along the Pipeline Corridor

The proposed water pipeline will traverse two districts viz., Bagamoyo District and Kinondoni Municipal Council. These two districts are part of Pwani Region and Dar es Salaam Region of Tanzania respectively. Bagamoyo is predominantly rural and Kinondoni Municipal Council is predominantly urban.

In Bagamoyo District, the water pipeline will pass through eight villages, namely Kongo, Matimbwa, Buma, Kiromo, Zinga, Kwamatumbi, Kerege and Mapinga.

In Kinondoni Municipality, the water pipeline will pass through the Sub-Wards of Bunju “A”, Boko, Wazo, SalaSala, Kunduchi, Tegeta and Mbezi.

The proposed pipeline will cross the Dar es Salaam- Bagamoyo paved trunk road at four places. Daily Traffic Counts taken at each of these locations by TANROADS is provided at Table 3.2 below.

TABLE 3.2: DAILY TRAFFIC COUNTS BAGAMOYO ROAD

Bagamoya Road Intersection	Daily Vehicular Traffic Count	Date of Traffic Survey
Lugalo	26,503	30th Aug 2007
Africana	14,561	30th Aug 2007
Bunju A	2,173	30th Aug 2007
Mapinga	1,889	23rd Dec 2008

The pipeline will also cross 6 main feeder roads, beside several minor feeder roads.

This section deals mainly with the socio-economic environment of the project influenced villages and wards based on data both reviewed and collected. In the absence of a consistent data-set for wards in both districts, only available information has been discussed. The data on population has been provided for all the Wards in both districts. The description of economy of both districts provided here are general in nature. The EIA team gathered data on social services and occupations for the pipeline corridor villages / Wards. Section 3.4 discusses the socio-economic baseline conditions of the surveyed households, based on the primary gathered by the EIA Team.

3.3.1 Demographic Characteristics

The major ethnic groups in Kinondoni are Zaramo, Ndengereko and Luguru but, due to a large influx of people from up-country, there is a sizeable multi-cultural mix. Also there are a number of Asiatic and Arabian groups, largely engaged in commercial and industrial activities.

Major ethnic groups in Bagamoyo include Wakwere, Zaramo, Zigua, Masai and Doe. There are also some people of Arabic and Asian origin, and from other parts of the country.

There are 82 villages spread across 16 wards in Bagamoyo District. The proposed water pipeline will pass through 8 villages located in three wards of Bagamoyo District, namely Kiromo, Zinga and Yombo wards.

Bagamoyo township is the biggest town in the district and the headquarters of Bagamoyo District Council. A number of rural settlements are fast growing, particularly those located along the trunk roads.

In Kinondoni District, there are 27 Wards having 127 Mitaa (sub-wards). The main settlements comprise residential, commercial and industrial establishments. According to the 2002 population census, Kinondoni District has a population of 1,088,867 people with a growth rate of 4.1% per annum³. The average household size is 4.1 and the population density is 2,825 persons per square km, influenced by natural causes and migration. The population density in the three relevant wards of Bagamoyo district ranges between 50-60 persons per square km, which is significantly higher than the district average of 23 persons per square km⁴. The population of the Project's Districts, by ward, is shown in Table 3.3.

TABLE 3.3: POPULATION BY WARD (2002)

Bagamoyo District				Kinondoni District			
SN	Wards	No. of Villages	Population	SN	Wards	No. of sub-wards	Population
1	Kiwangwa	6	16,094	1	Mburahati	3	21,608
2	Msata	5	9,499	2	Sinza	5	36,469
3	Miono	9	19,732	3	Makuburi	3	34,633
4	Mkange	4	10,023	4	Mabibo	5	73,978
5	Magomeni	2	17,986	5	Manzese	6	66,866
6	Dunda	2	13,237	6	Ubungo	5	44,339
7	Kiromo	3	5,284	7	Kigogo	3	37,964
8	Zinga	7	15,725	8	Makurumla	6	53,794
9	Yombo	4	7,165	9	Mbezi	5	32,641
10	Vigwaza	5	13,497	10	Kimara	5	66,288
11	Talawanda	5	9,538	11	Goba	4	8,517
12	Chalinze	7	32,346	12	Kibamba	4	17,998
13	Lugoba	8	15,917	13	Kawe	6	94,535
14	Ubenazomozi	6	16,205	14	Mikocheni	3	27,283
15	Mbwewe	6	18,542	15	Mbweni	3	3,475
16	Kibindu	3	8,195	16	Kunduchi	7	72,927
	TOTAL	82	228,985	17	Msasani	5	43,457
				18	Bunju	5	20,868

³ Strategic Plan For Kinondoni Municipality 2007-2010

⁴ Bagamoyo District in Brief, National Bureau of Statistics, 2002

Bagamoyo District				Kinondoni District			
SN	Wards	No. of Villages	Population	SN	Wards	No. of sub-wards	Population
				19	Makumbusho	5	55,702
				20	Hananasif	3	32,023
				21	Magomeni	5	22,616
				22	Ndugumbi	4	37,429
				23	Kijitonyama	7	47,096
				24	M'Nyamala	6	44,531
				25	Mzimuni	4	25,283
				26	Kinondoni	4	21,489
				27	Tandale	6	45,058
					TOTAL	127	1,088,867

Source: National Bureau of Statistics, 2002

Note: The proposed pipeline will pass through the Wards whose names are highlighted

3.3.2 Economic Characteristics

Agriculture is the main source of livelihood in Bagamoyo District. Refer Table 4.3. Major food crops are maize, sorghum, paddy, cassava and sweet potatoes. Cash crops are mainly coconut, cashew nuts, cotton and pineapple. Along with agriculture, the local people in Bagamoyo district are also engaged in livestock rearing. The Maasai pastoralists from North Tanzania have settled in the district. During the dry season the Barbaig pastoralists visit the district in search of pasture and water. An industrial estate (Kamal Industrial Estate) is currently under development close to Zinga and Kwamatumbi villages, which will host steel production factories among others.

The economy of Kinondoni Municipal Council is characterized by informal and organized business. Mainly along the existing pipeline there are numerous trading centers which are located along the Bagamoyo Road. The businesses range from tree seedlings for fruits, flowers, pineapples, to sand-concrete blocks and decorative bricks, and food vendors. Also, in Tegeta, there are is a long stretch of vendors selling, agricultural products such as bananas, potatoes vegetables, water melons, pumpkins etc. Its proximity to Dar es Salaam has allowed the district to diversify economically. The area is also booming in construction work, and there are numerous hardware shops selling building materials. Industrialization on small and medium scale is a common feature in the Municipality. Small-scale industry concentrates in domestic production sectors scattered throughout the Municipality and located mostly in residential areas. Individuals and groups are engaged in production of a wide range of goods in this sector. Medium sized industries are located in the designated industrial areas of Ubungo, Mikocheni and Tegeta. As of 2008 there were 49 registered industries.

Due to lack of data on economic characteristics by Ward, the details have not been provided here. The description is based on observation and discussions with officials.

3.3.3 Social Characteristics and Infrastructure

Education

In Bagamoyo District there are 18 day-care centres, and 71 pre-primary schools of which 55 are public and 16 are private. There are 115 primary schools, of which 113 are public and 2 are privately owned. There are 18 secondary schools, of which 9 are public and 9 privately owned. There is at least one primary school in Congo, Kiromo, Mapinga, Kerege and Zinga, as shown in Table 4.3. There are no government-owned secondary schools in these villages. However, there are four private secondary schools in Kerege, Breakthrough, Baobab, Lengo and Grace.

The teacher-pupil ratio is 1:34 in Zinga, 1:48 in Yombo (1:48) and 1:42 in Kiromo ward⁵. This ratio is higher in the other wards of Bagamoyo District.

In Kinondoni Municipality there are 47 day-care centers, 198 primary schools, of which 131 are government owned and 67 private, and 86 secondary schools, of which 16 are government owned and 70 private sector. The teacher to pupil ratio is 1:47 for the district as a whole. The breakdown is not available by ward.

Health Services

The mode of Health service delivery in Bagamoyo District like other districts in Tanzania is based on curative, preventive and basic health care as well as rehabilitative services provided either by the government or private sector. In 2005, the top five diseases in the District included malaria, diarrhea, intestinal worms and pneumonia. There are in total 49 dispensaries in Bagamoyo District. Within the pipeline corridor, all three Wards have dispensaries. These are located in Kongo, Kiromo, Zinga, Kerege and Mapinga villages (Table 3.4). The population served per health facility was 4,163 persons in the year 2002. The same ratio is in favour of patients in the three pipeline corridor Wards, with Kiromo and Yombo wards registering less than 1,800 persons per health facility.

In Kinondoni Municipality the health services are provided by 23 government health facilities. These include the Municipal Hospital at Mwananyamala, two health centres located in Sinza and Magomeni, and 20 dispensaries located in the sub-wards. In the project areas, there is at least one dispensary in Bunju, Boko, Mbezi, Salasala and Tegeta. There are 193 Reproductive and Child Health Centres, out of which 148 are private. The ratio of population per physician is an indicator of health infrastructure facilities. In this district, the ratio is 1:73,622, which is high. The infant mortality rate for the district stood at 115, and the life expectancy at birth was 49 for females and 50 for males⁶ for the district, which is low.

Water Supply

The main sources of water supply in Bagamoyo District are the Wami and Ruvu rivers. The water supply schemes constructed on lower Ruvu provide water to Bagamoyo district as well as Dar es Salaam. The Wami water supply scheme is exclusively for Bagamoyo district. There are 59 dams and 129 shallow and deep wells. The ground water potential along the coastal zone is high. However, the quality is affected by high salinity levels.

⁵ Bagamoyo District in Brief, National Bureau of Statistics, Govt of the United Republic of Tanzania, 2002
⁶ Municipal Profile 2010, Kinondoni Municipal Council

TABLE 3.4: SOCIO-ECONOMIC PROFILE ALONG THE PIPELINE CORRIDOR

SN	Name of the Village/Ward	Population	Avg. land-holding size (ha)	Health Infrastructure	Education Infrastructure			Occupation		
					Primary	Secondary	Others	Agriculture	Business/shops	Others
1	Kongo	2,251	1	Dispensary	✓	-	-	✓	✓	-
2	Buma	1,727	2	Dispensary	✓	-	-	✓	✓	-
3	Matimbwa	1,710	2	Dispensary	✓	-	-	✓	-	-
4	Kiromo	2,837	-	Dispensary	✓	-	-	✓	-	-
5	Zinga	4,036	2	Dispensary	✓	✓	-	✓	-	-
6	Kwamatumbi	1,521	-	Dispensary	✓	-	-	✓	-	✓
7	Kerege	2,851	3	Dispensary	✓	✓	-	✓	-	✓
8	Mapinga	4,251	3	Dispensary	✓	-	-	✓	-	✓
9	Bunju	6,240	1	Dispensary	✓	-	-	-	-	✓
10	Boko	8,803	1	Dispensary	✓	✓	-	-	-	✓
11	Sala Sala	5,410	-	Dispensary	✓	✓	-	-	✓	✓

Sources: National Bureau of Statistics, 2002 and the District Profiles of Bagamoyo and Kinondoni Municipal Council districts and information collected from Village/Ward officials

Most of the villages in Bagamoyo District are supplied with piped water. There are ten piped schemes which provide clean and safe water to approximately 170,000 people. Of the ten piped schemes, 8 are minor, providing water to a population of about 50,000. The remaining two schemes deliver treated water to a population of about 120,000. The water supply scheme drawing water from Ruvu River covers 15 villages, out of which eight villages are within the project area. These villages include Kongo, Matimbwa, Buma, Kiromo, Zinga, Kwamatumbi, Kerege and Mapinga.

Unlike Bagamoyo District, there is scarcity of water in Kinondoni Municipality. In order to alleviate the water problem, the council purchased a drilling rig and compressor. Currently the drilling rig is used to drill borehole in areas with a shortage of water. Out of the planned 57 deep wells for the period 2002 to 2005, 63 deep wells were drilled. Also, during the same period, 22 shallow wells were planned and 16 constructed. In order to enhance good water supply the Municipality rehabilitated 14 deep wells and one shallow well.

3.4 Socio-Economic Profile of the Sample Households

The EIA Team, after carrying out the review of secondary data and undertaking transect walks, prepared a questionnaire to carry out a socio-economic survey of the potentially affected households on a sample basis. Such an exercise was carried out since there will be impact on properties along the proposed pipeline route, social services and other inconveniences during the construction period. Out of the total of 187 households, a total of 51 households were surveyed on both sides of the pipeline. The findings of the survey are summarized in Table 3.5.

3.5 Educational Profile

Education provides an important indicator of the status of the households. The survey revealed that nearly half of the surveyed persons in the rural areas in Bagamoyo district reported to be illiterate, where as in the urban and semi-urban areas located in Kinondoni Municipal Council, the literacy rate was reported to be more than 80% with more than two third having attained primary education.

In terms of secondary education, Sala Sala was highest with more than 40%. However, among the surveyed households, not one person had attained secondary education in Kongo Village.

3.5.1 Type of Houses Based on Floor, Roof and Wall Construction

The survey of households revealed that the majority (66.7%) have cement floors, while the remainders use mud (17.9%) and tiles (15.4%). Regarding wall construction materials, 76.9% use cement blocks, and 23.1% use stick and mud. For roof materials, 92.3% of the houses have iron sheets, while 5.1% use coconut leaves, and 2.6% grass.

3.5.2 Water Sources

The survey of households in the project area indicates that 20.5% use tap water inside the house, 28.2% use tap water outside the house, and 48.7% use a community stand-post. The remainder use covered and open water wells. All villages and wards have access to piped water. However, in Kongo village households also use dug wells. Dug wells are also frequently used in Buma, Matimbwa and Kiromo villages, as observed during the transect walk.

3.5.3 Occupation

As indicated in Table 4.4, more than 50% of households in villages in Bagamoyo District depend on agriculture for their livelihood. Across villages/wards, more than 20% work as wage labour. Another notable feature of the occupation of the surveyed households was employment in the informal sector, particularly in running shops and small business in the urban areas of Kinondoni Municipal Council. In the Sala Sala area more than 60% of the surveyed households were engaged in shops and trading.

TABLE 3.5: SOCIO-ECONOMIC PROFILE OF POTENTIALLY AFFECTED HOUSEHOLDS

SN	Name of Village / Ward	Total Affected HH	Population of Total Affected HH	Sample Size (HH Surveyed)	Total Sample Population	Educational Status (%)			Occupation (%)				Access to Drinking Water	
						Illiterate	Primary	Secondary	Agriculture	Labour	Business / shops	Others	Piped	Other sources
1	Kongo	40	249	3	22	50	50	-	60	20	-	20	✓	Dug well
2	Kerege	6	66	5	59	59	36	5	60	20	10	10	✓	Dug well
3	Mapinga	12	69	4	24	35	45	20	60	20	10	10	✓	Dug well
4	Bunju "A"	8	80	5	59	20	60	20	-	20	-	80	✓	-
5	Boko	34	204	9	50	10	80	10	10	30	20	40	✓	-
6	Tegeta	30	128	11	38	15	70	15%	-	50	30	20	✓	-
7	Sala Sala	57	217	14	42	10	47	43	-	-	60	40	✓	-

Source: Household Survey, August-September, 2010

4 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

The EIA study has been guided by the NEMC's EIA Guidelines (March 2002), MOW's Environmental Guidelines for the Road Sector (December 2004), the World Bank's Policies on Environment and Involuntary Resettlement, and the World Bank's Operational Policies on Environmental Assessment (OP 4.01), Natural Habitats (OP 4.04), Forests (OP 4.36), Involuntary Resettlement (OP 4.12) and Cultural Property (OP 11.03). The administrative framework and relevant policies and legislations are discussed below.

4.1 Overview of Administrative Framework

The administrative authority for environmental assessment and monitoring at national level is vested in the office of the vice-president. Part III of EMA, 2004 provides details of Administrative and institutional framework for environmental management in Tanzania. The Act mentions the following seven (7) institutions which are involved in environmental management in Tanzania:

- i. Minister responsible for Environment;
- ii. National Environmental Advisory Committee;
- iii. Director of Environment;
- iv. National Environment Management Council (NEMC);
- v. Sector Ministries;
- vi. Regional Secretariat; and
- vii. Local Government Authorities (City, Municipal, District, Township, Ward, Village, sub-village "*Mtaa and Kitongoji*").

The Minister responsible for Environment has overall responsibility for matters related to environment, including the approval of the EIA reports.

The National Advisory Environmental Committee is comprised of members with experience in various fields of environmental management in the public and private sector and in civil society. The committee advises the Minister on any matter related to environmental management.

The Division of Environment which is headed by the Director of Environment deals with the development of Environmental policy and co-ordination of its implementation. It also plays an advisory role to the Government on all matters pertaining to environmental management.

The National Environmental Management Council (NEMC) has the overall responsibility of undertaking enforcement, compliance, review and monitoring of Environmental Impact Assessment, and in this regard facilitates public participation in environmental decision making. Other functions of NEMC include recommendations to the Minister to approve, reject, or approve with conditions, specific EIS and to make recommendations on whether to revoke EIA Certificates in cases of non-compliance.

The Sector Ministries are required to establish Sector Environmental Sections headed by the Sector Environmental Coordinator which, among other things, have the responsibility to ensure environmental compliance by the Sector Ministry and to oversee the preparation of, and implementation of, all EIA's required for investments in the sector.

The Regional Secretariat, which is headed by the Regional Environmental Management Expert, is responsible for the co-ordination of all environmental management programs in their respective regions.

The Local Governments including City, Municipal, District Councils, Town Councils, Township, Kitongoji, Ward, Mtaa and Village ensure the enforcement of EMA, 2004 at the respective local level. Among other things, they are involved with monitoring the preparation, review and approval of EIAs for local investments in the respective jurisdiction.

However, within the scope of this pipeline project the study team also considered the institutional/administrative roles of the World Bank/MCC, MCA-T, DAWASA and DAWASCO. These are briefly stated below.

DAWASA

This is the implementing agency (client) on behalf of the GoT and therefore has overall oversight function. Specifically, the DAWASA Act of 2001 stipulates that, among other things, the functions of DAWASA shall be to develop and maintain water works connected with the supply of water and to plan and execute new projects for the supply of water. In view of the foregoing, DAWASA, in collaboration with relevant authorities, will work closely with the consultant to ensure that the project objectives are achieved throughout the implementation process.

WB/MCC

The Millennium Challenge Corporation ("MCC") reviews environmental and social impacts to ensure that the projects undertaken as part of programs funded under Millennium Challenge Compacts are environmentally sound, are designed to operate in compliance with applicable regulatory requirements, and, as required by the legislation establishing MCC, is not likely to cause a significant environmental, health, or safety hazard.

Whereas the MCC finances this study, the World Bank will finance the actual construction of the pipeline.

MCA-T

This is the Accountable Entity working between the GoT and MCC with the principal responsibility to oversee the implementation of MCC funded projects and their various components and activities on behalf of the government of Tanzania. MCA-T is fully accountable for the overall management of the implementation of the project and its final results consistent with the grant agreement.

4.2 Local Policies and Legislation**4.2.1 National Policy Framework**

Various national policies relevant to this project have been considered. The summary of policies reviewed and their relevance is provided below.

National Environment Policy (1997)

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

In regards to environmental management and protection the policy identifies six key problem areas as:

- i. Land degradation;
- ii. Lack of access to good quality water;
- iii. Environmental pollution;
- iv. Loss of wildlife habitat and biodiversity;
- v. Deterioration of aquatic ecosystems; and
- vi. Deforestation.

The objective of National Environmental Policy on Water and Sanitation Sector is to support the overall national objective of providing clean and safe drinking water to within easy reach, to satisfy other water needs, to protect water sources and to prevent pollution of the Environment. In order to achieve this, the following policy objectives shall be pursued:

- Planning and implementation of water resources and other development programmes in an integrated manner and in ways that protect water catchment areas and their vegetation cover;
- Improved management and conservation of wetlands;

- Promotion of technology for efficient and safe water use, particularly for water and wastewater treatment and recycling; and
- Institution of appropriate user-charges that reflect the full value of water resources.

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

Relevance to the Project

The project will be required to address policy objectives by ensuring that unnecessary damage to the biophysical and social environment is avoided or minimized during implementation of the project activities which are expected to have adverse impacts.

Agricultural and Livestock Policy (1997)

The Agricultural Policy (1997) recognizes that due to poor agricultural practices, deforestation has resulted from shifting cultivation and pollution of wetlands from misuse of agro-chemicals, are major environmental issues. The overall aim of the Agricultural and Livestock policies are to promote and ensure a secure land tenure system to encourage the optimal use of land resources, and facilitate broad-based social and economic development without upsetting or endangering the ecological balance of the environment. Land occupiers are required to develop land use plans where by a certain amount of land is put aside for livestock grazing while the area for agriculture is also categorized. This is done to minimise conflict between farmers and livestock keepers. It has also an advantage in relation to proper land management and conservation.

Relevance to the Project

During the study it was observed that a limited level of interference will be felt in agricultural and livestock lands of Bagamoyo district where no land-use plans exists. In the Kinondoni municipality there will be minimum impacts on private lands.

In most cases the proposed pipeline construction corridor passes through existing sites in private lands in both Kinondoni municipality and Bagamoyo District. Therefore minor specific issues regarding agricultural land and/or pasture are expected to emerge during the proposed works.

National Land Policy (1995)

The National Land Policy of 1995 (Revised in 1997) recognizes the need for protecting environmentally sensitive areas such as catchment areas, rivers, fragile waterways, game reserves, etc. The policy stresses that these sensitive areas should not be allocated to individuals.

The National Land Policy set in motion a land reform giving respect to customary and common rights. In addition, roles of government in land tenure and management have been devolved to the local level and establishment of supporting systems for land registration and entitlement to the village level.

The policy emphasizes on the protection of environment and natural ecosystems from pollution, degradation and physical destruction. In addition, the policy recognizes the importance of social services such as water, roads, energy and solid waste management for environmental protection. It also identifies the need for conservation and preservation of prehistoric/historic sites and buildings.

Relevance to the Project

This policy is relevant to the proposed project and the project design will need to ensure protection of existing land ownership patterns, social services, proper disposal of solid wastes and suitable landscape works to protect sensitive areas along the construction corridor.

National Water Policy (2002)

National water policy (2002) objective is to develop a comprehensive framework for sustainable management of the national water resources. In this case the policy recognizes the need to protect water sources against pollution and environmental degradation. The Water Policy reflects the shift in approach towards comprehensiveness and economics. In addition, the Policy aims at ensuring that beneficiaries participate fully in all states of water resource developments and recognizes the fundamental but intricate linkages between water and socio-economic development, including environmental requirements. The Policy expounds on the importance of water for domestic use, agriculture, livestock keeping, mining, energy, fisheries, environment, human health, wildlife and tourism, forestry, navigation and trans-boundary requirements. The policy states that *“a holistic water (river) basin approach, integrating multi-sector and multi-objective planning and management, should be taken in order to ensure sustainability and protection of the resource”*.

With these basic shifts in approach and the attempt to co-ordinate and harmonize the sectoral policies, it is in line with the guidance from the Convention on Wetlands and the vision of the National Environmental Policy.

Relevance to the Project

The proposed project could result into erosion of river banks if not designed and executed properly. In this case pipeline route designs need to ensure water sources (including streams which ultimately flow into the water sources) are suitably protected to minimize impacts during the construction phase of the project.

Energy Policy of Tanzania (1992)

Objective of this policy is to provide input into development process through the establishment of an efficient energy production and distribution resulting in an environmentally sound exploitation of available resources. The policy promotes strategies that could be adopted by the Project including the development of alternative energy sources, increase fuel wood efficiency, promoting renewable energy, and introducing reforestation and improved kilns for charcoal production.

Relevance to the Project

The policy is relevant to this project because there may be the need to cut down trees and shrubs, which is the major source energy supply in the project area. It is expected that the developer will ensure that necessary (replacement) tree planting programs are implemented in an environmentally sound manner.

National Gender Policy (1999)

Main objective of this policy is to provide guidelines to ensure gender sensitive plans, programs and strategies in all sectors and institutions. The policy gives emphasis on gender equality with its aims at establishing strategies on poverty eradication through ensuring that both women and men get access to existing resources for their development. It values the role played by women in bringing about development in the society.

Construction sector is also highly committed to gender mainstreaming at all levels, through provision of equal opportunities to both men and women in road works and related activities.

Relevance to the Project

The policy requires the project management to ensure that gender issues are given emphasis. It also requires that women and men are given equal employment opportunities in the project, whenever possible.

National Mining Policy (1997)

The Mineral Policy covers all activities regarding extraction from the ground. This includes minerals and material such as that for construction. The policy however, promotes private sector led mineral development relegating the role of the government to regulation, promotion and facilitation. The responsibilities of the government include monitoring of mining activities, collection and maintenance of geo-technical data for promotional purposes and administration and inspection of mining activities, and environmental management with regards to mining.

Relevance to the Project

The project sourcing for materials shall be guided under this policy as extraction of sand, gravel and stone are considered as mining.

National Forest Policy (1988)

The Policy goal is to enhance the contribution of the forest sector to the sustainable development of the nation and the conservation and management of natural resources for the benefit of present and future generations. To attain this goal the policy focuses on four main areas; land management, forest based industries and products, ecosystem conservation and management and institutions and human resources. The national forest policy has three key statements pertaining to the proposed project:

- i. **Policy statement (1):** To ensure sustainable supply of the forest products and services and environmental conservation, all types of forest reserves will be managed for production and/or protection based on sustainable management objectives defined for each forest reserve. The management of all types of forest reserves will be based on forest management plans.
- ii. **Policy statement (5):** To enable sustainable management of forests on public lands, clear ownership for all forests and trees on those lands will be defined.
- iii. The allocation of forests and their management responsibility to villages, private individuals or to government will be promoted. Central, local and village governments may demarcate and establish new forest reserves.
- iv. **Policy statement (15):** New forest reserves for biodiversity conservation will be established in areas of high biodiversity value. Forest reserves with protection objectives of a national strategic importance may be declared as nature reserves.

This statement allows for local governments to enforce protection on locally determined areas of importance for conservation or production.

Relevance to the Project

Forest and thickets characterize the vegetation of various villages and districts along the construction corridor. The forest Policy recognizes that investment in forest areas may cause adverse environmental impacts. The EIA study will take on board all policy provisions in order to ensure damage to the environment is avoided and possible mitigation measures are provided.

Tanzania Wildlife Policy (1998)

The aim of the policy and regulatory framework is to involve a broader section of the society in wildlife protection, utilization, management and development of protected areas. The wildlife sector mandate is sustainable utilization of the wildlife resources. Anti-poaching activities have been intensified resulting in the decrease of poaching incidences. The wildlife policy and legislation focuses on peoples' participation in the conservation and protection of the resources. The policy has facilitated improvement in performance of the sector in attaining the overall goal of effective conservation and sustainable utilization of the wildlife resources.

Relevance to the Project

The policy is relevant to the project due to the existing birdlife and ecosystems of conservation interest.

However, the proposed pipeline construction project is not close to any protected area ecosystem. Further, the project area is poorly endowed with game species and there are no rare and endangered species of conservation interest.

National Employment Policy (1990)

The major aim of this policy is to promote mainly of Tanzania Nationals. Relevant sections of this policy are (i) Section 10, which lays down strategies for promoting employment and section 10.1 is particularly focusing on industry and trade sectors (ii) Section 10.6 which deals with employment of special groups ie women, youth, persons

with disabilities and (iii) Section 10.8 which deals with the tendencies of private industries to employ expatriates even where there are equally competent nationals.

Relevance to the Project

The EIA study will fully abide by the provisions of this policy. The contractor and DAWASA will abide to the relevant provisions of the policy to ensure that local residents, especially the youth, women and other vulnerable groups, are given priority in all employment opportunities that will arise during the construction and operational phases of the project.

National Human Development Policy (2000)

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

The NHSDP provides for coordination of the land policy, land development, human settlements developments, surveys, valuation, sites and services, land registration of documents, chattels transfer, formulation and implementation of national housing policy, building research, urban physical structure policy, town planning, master plans, maps and regional physical planning. It also recognizes planning and management of human settlement areas as one of the broad human settlement issues. Within this regard, the NHSDP identifies environmental protection as one of the strategic issues in human settlement planning and development. NHSDP also addresses the following issues:

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

Relevance to the Project

This EIA is undertaken to ensure that DAWASA and the Construction Contractor will abide to the relevant provisions of the policy.

National Health Policy (1990)

One of the main objective of this policy is to ensure that health services are available and accessible to all people wherever they are in the country, whether in urban and rural areas. The policy encourages safe basic hygienic practices in workplaces, promote sound use of water, promotes construction of latrines and their use, encourage maintenance of clean working environment which is conducive to satisfactory work performance. The policy puts more emphasis on workers protection against all health hazards which occur in work places.

Relevance to the Project

The implementation of this project will ensure that all the staff, workers and the local communities are well informed and protected against all health risks, especially against the spread of HIV/AIDS.

National Policy on HIV / AIDS (2001)

The policy provides a framework for leadership and coordination of the National multispectral response to the HIV/AIDS epidemic. One of the major objectives of the policy is to strengthen the role of all the sectors, public, private, NGOs, faith groups, CBOs and other specific groups to ensure that all stake holders are actively involved in

HIV/AIDS work and to provide a framework for coordination collaboration. The policy recognizes that HIV infection shall not be grounds for discrimination in relation to education, employment, health and any other social services. Pre-employment HIV Screening shall not be required.

Relevance to the Project

For persons already employed, HIV/AIDS screening, whether direct or indirect, shall not be required. HIV infection alone does not limit fitness to work or provide grounds for termination. HIV/AIDS patients shall be entitled to the social welfare benefits like other patients among the employees. HIV/AIDS information and education targeting the behavior and attitudes of employees and water supply to some parts of Bagamoyo and Kinondoni will result into social interactions among workforce and therefore DAWASA need to adhere to the policy.

This EIA study takes on board all the relevant provisions of the HIV/AIDS policy and provides an action plan to prevent the spread of this disease during project implementation

The Tanzania Development Vision (2025)

Composite Development Goal for the Tanzania Development Vision 2025 (URT, 2000) foresees the alleviation of poverty through improved socio-economic opportunities, good governance, transparency and improved public sector performance. These objectives, not only deal with economic issues, but also include social challenges such as education, health, the environment and increasing involvement of the people in working for their own development. The thrust of these objectives is to attain a sustainable development of the people. The Vision 2025 seeks to mobilize the people, the private sector and public resources towards achieving shared goals and achieve sustainable semi-industrialized middle market economy by year 2025.

Relevance to the Project

The construction of the water pipeline between LR WTP and the University reservoirs in Dar es Salaam is aimed at increasing water supply for development and improvement of livelihoods.

This EIA is undertaken to ensure that the Project is consistent with the relevant provisions of the Vision 2025.

The National Strategy for Growth and Reduction of Poverty (NSGRP)

The National Strategy for Growth and Reduction of Poverty (NSGRP) or Mkakati wa Kukuza Uchumi na Kuondoa Umaskini Tanzania (MKUKUTA) is focusing on promoting economic growth and reducing poverty in Tanzania. The NSGRP is a five years program from 2005/06 to 2009/10, which addresses the Tanzania Development Vision 2025 for high and shared growth, high quality livelihoods, peace, stability and unity, good governance, high quality education and international competitiveness. In addition, NSGRP is contributing to implementation of the Millennium Development Goals (MDGs).

The main objective of the NSGRP is to stimulate economic growth and reduce poverty, improve quality of life and social well-being and improve good governance and accountability. The strategy recognizes the close linkages between economic growth, good governance and improved quality of life and social well-being, and poverty reduction.

Among the various factors that have been identified to stimulate growth is the improvement of water supply in order to stimulate economic growth.

Relevance to the Project

Project implementation is consistent with the relevant provisions of the NSGRP, as it seeks to improve water supply to the commercial hub of the nation, thereby encouraging economic growth and improving living standards.

THE NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN (NBSAP), NATIONAL ENVIRONMENTAL ACTION PLAN (NEAP) AND NATIONAL ADAPTATION PROGRAMME OF ACTION (NAPA)

In any successful conservation effort it is implicit that regular or continued monitoring and impact assessments be conducted especially to collect information on status of biodiversity, activities and processes which are likely to have adverse impacts on the conservation and management of biodiversity. To this end, the NBSAP was formulated to address implementation of the strategic choices within the following broader categories:

- Policy Issues and International Co-operation;
- Planning and Co-ordination;
- Education and Information;
- Research and Development;
- Ecosystems and species conservation and sustainable utilization;
- Biodiversity Monitoring and Evaluation; and
- Capacity building.

The main objectives of the NBSAP include the facilitation of economic growth through formulation and enforcement of appropriate policies and regulatory services including important assessments for the management of environmental resources. The NBSAP calls for the adoption of the community participation machinery at all levels. These issues are very relevant and will be taken on board during the EIA study.

In addition, the EIA study will have to rely on the guidance contained in various national environmental strategy documents, such as the National Conservation Strategy for Sustainable Development (NCSSD), the National Adaptation Programme of Action (NAPA) and the National Environmental Action Plan (NEAP)

4.2.2 National Legal Framework

This section addresses the legal and regulatory framework, which is relevant to the proposed pipeline construction project. The legal and regulatory framework provides the various legal aspects that must be adhered to as the project is designed, implemented and later when it is decommissioned.

Environmental Management Act (2004) – Cap 191

Environmental Management Act No. 20 of 2004 is the principle legislation governing environmental management in the country. The Act recognizes the right of every citizen to clean, safe and health environment, and the right of access to environmental resources for recreational, educational, health, spiritual, cultural and economic purposes.

Thus, the Act provides a legal framework for coordinating harmonious and conflicting activities by integrating those activities into overall sustainable environmental management system by providing key technical support to Sectoral Ministries.

In order to ensure there is effective implementation of national environmental policy objectives, the Act has identified and outlined specific roles, responsibilities and functions of various key players and provides a comprehensive administrative and institutional arrangement which consists of:

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

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

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

Relevance to the Project

The Act is relevant because the project is expected to have some adverse impacts to the environment (such as noise, vibration, and dust during construction stage) during construction. Thus, monitoring of the mentioned parameters would require adherence to the developed environmental standards (international and national) and environmental management plans to be prepared as part of design for the proposed project. However, the pipeline is carrying treated water and there are no solid, liquid, gaseous and hazardous wastes pollution created during its operation. As a consequence it does not require any auditing.

There is a separate contract for the expansion of the Lower Ruvu water treatment plant which will produce various wastes and pollutants and the management of these have been covered in a separate EIA study.

The Environmental Impact Assessment and Audit Regulations (2005)

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

Part III of The Environmental Impact Assessment and Audit Regulation, formed under G.N. No. 349 of 2005, deals with project registration and screening procedures. Section 5 requires the registration applicant for Environmental Impact Assessment Certificate to submit a project brief report in the format shown in the THIRD SCHEDULE of the EMA (2005) and FIRST SCHEDULE of the regulation. According to the provision, the applicant is required to submit a project brief report to the National Environmental Management Council (NEMC). Section 6(1) requires a developer/project proponent to register the project in accordance with format specified in the THIRD SCHEDULE of the regulations. The section also, specifies issues to be covered by the proponent in the project brief report. Section 6 (3) requires a project brief to be prepared by a registered environmental impact assessment expert.

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

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

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

Part IV Section 13(1) requires the proponent to conduct EIA in accordance with general environmental impact assessment guidelines and in accordance with the steps outlined in the FOURTH SCHEDULE of the regulations. Section 16 specifies EIA study should examine environmental, social, cultural, economic and legal issues.

The FIRST SCHEDULE gives list of projects subjected to EIA and those that do not requiring EIA and it categorizes the projects into two types:

- Type A – projects requiring a mandatory EIA; and
- Type B – project requiring PEA.

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

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

Relevance to the Project

This project is an infrastructure project that falls under Type A category of Tanzanian legislation. A project of this categorization is likely to have some social and environmental impacts. All phases of the EIA study will abide by the provisions of this Act.

Occupational Health and Safety Act No. 5 of 2003

Part IV of this Act make provisions for safety, health and welfare for persons at work in factories and other places of work; to provide for the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with activities of persons at work. Proposed pipeline construction operations will entail the employment of both skilled and unskilled laborers, and as such will comply with this Act. Part III of the Act calls for the registration of the factory or workplaces to obtain compliance certificate as well as submission of drawings in blue prints which depict vital sections to the Chief Inspector for approval.

Occupational health and safety are key aspects in the operations. First aid equipment, sanitary facilities and effective Personal Protective gears will be provided to employees and maintained by the contractor during the period of construction.

Relevance to the Project

The EIA study and project management will be required to fully abide by the provisions of this Act to make sure that the safety of contractor's staff and people living along the construction corridor is effectively protected. The contract documents prepared for the construction of the pipeline requires the contractor to produce the following:

- Submit a work plan;
- Provide the following training to DAWASCO staff:
 - Detailed description of new valves and equipment including models, specifications, etc;
 - Understanding and using manufacturer's documentation;
 - Function and capabilities;
 - Emergency stop procedures in the event of pipe breakages;
 - Routine maintenance schedules and spare parts and other equipment supplied under the Contract;
 - Maintenance procedures and replacement of spare parts. Describing which components should only be handled / repaired by authorized persons, including the possibility of invalidating manufacturer's warranties;
 - Specialist tools and their use;
 - Trouble shooting and fault finding;
 - Health and safety issues related to its usage (HV, chemicals, rotating, high pressure, moving parts, heat, noise, fumes, etc);
 - Maintaining and updating the O&M manual as a working document.
- Workers must wear Specify Protective Gears.

Local Government Act (District and Urban Authorities) of 1982

This Act provides for detailed responsibility for urban and district councils in the administration of their day-to-day activities. EIA and waste management is pointed out as one of the activities to be managed by both district and urban authorities.

Relevance to the Project

The proposed pipeline project activities including this EIA process will seek to liaise closely with Kinondoni Municipal Council, Bagamoyo District Council and other key stakeholders in the project area.

The project management will be required to fully abide by the provisions of this Act.

Land Act No. 4 and Village Land Act No. 5 of 1999

The Land Act seeks to control land use and clarify issues pertaining to ownership of land and land-based resources, transactions on land and land administration. This act identifies three categories of land — village, public and general, and distinguishes protected or restricted land (eg. national parks, forest reserves, etc), and ensures that tenure and rights of legitimate land users are considered and respected. Land sensitivity and potential environment impacts of the proposed pipeline construction works shall be considered in order to ensure that the land is not polluted and to allow for natural and rapid restoration of cleared vegetation or disturbed land.

The Village Land Act provides for legal framework for the management and administration of land in villages. The Act empowers the Village institution or Council to manage all village land. It is important therefore that there should be close consultations and consideration of views of local authorities over any matter, eg. Compensation of damaged properties resulting from the implementation of the project.

Relevance to the Project

The design and implementation of this EIA process is consistent with both legislations. The proposed pipeline route will follow the existing pipe and, where private / village land is required, the provisions of the land and village Acts will apply.

The Resettlement Policy framework of Dawasa, 2003

For the Dar es Salaam Water Supply and Sanitation Project (DWSP), DAWASA prepared the resettlement policy framework to address the resettlement issues emerging from the implementation of the said project. This RPF contains the guidelines for preparing the RAP. It highlights the resettlement principles and objectives, institutional and legal framework, entitlement policy including the eligibility criteria, entitlement matrix, which takes care of the provisions of eligibility as given in OP 4.12 and implementation arrangements.

Relevance to the Project

The preparation of preliminary RAP will benefit from this RPF, particularly in terms of implementation arrangements and their experiences during the project execution.

The Resettlement Policy Framework, 2007

The Ministry of Lands, Housing and Human Settlements Development of the Government of United Republic of Tanzania prepared the Resettlement Policy Framework (RPF) an instrument to be used throughout the land Reform Program under Private Sector Competitiveness Project (PSCP). The framework was designed to formalize land titling in Tanzania particularly in Dar es Salaam and Mwanza cities, Babati and Bariadi districts in order to establish safeguard measures to ensure sustainable environmental development. The prospect of taking land from occupants during project implementation was raised the need for preparation of a Resettlement Policy Framework that meets the policy requirements of the Republic of Tanzania and the World Bank's Safeguard Policies for involuntary resettlement of residents as per OP 4.12. This RPF explains categories of losses, provides a comparative view of the Tanzanian Laws and the WB OP 4.12 institutional and legal framework, eligibility criteria, cut-off date, land tenure and ownership, institutional arrangements and complaints and grievance mechanism.

Relevance to the Project

This RPF describes screening process and process for carrying out the baseline. This will help in preparing the Preliminary Resettlement Action Plan in terms of throwing light on land ownership and compensation mechanism.

The Wildlife Conservation Act No.5 OF 2009

This legislation was enacted to protect and ensure the conservation of wildlife species. The Act operates in accordance with the requirements of the Convention on International Trade in Endangered Species (CITES), the National Park Ordinance and other related legislations. Though there are no flora and fauna of conservation interest, the EIA process will fully observe the provisions of this Act.

Relevance to the Project

The EIA study will fully abide by the provisions of this Act. The environmental assessment process will take into account specific environmental conditions and wildlife habitats along the entire pipeline corridor to ensure that existing ecosystems are not disturbed.

Mining Act, No. 17 of 1980, as Amended

The Act sets out government policy on all forms of mining and is supported by various regulations covering claims, prospecting rights, mining rights and royalties. Mining license applicants are required to submit plans for environmental protection. Each industry is required to establish realistic resource recovery standards and to adhere to them. Mining plans must be presented before operations begin.

Relevance to the Project

The implementation of this pipeline project may involve a certain level of sand mining and will therefore take on board all the relevant provisions of the mining act.

Water Resource Management Act, 2009

The Water Resources Management Act of 2009 principally seeks to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways that take into account ten (10) fundamental principles including:

- Protecting biological diversity especially the aquatic ecosystems;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Providing for systems to for managing the growing demand for water use through integrated planning and management of surface and groundwater resources, in ways that incorporate economic, environmental and social dimension in the planning process;
- Proving implementation of international obligations stipulated under international legal instruments to which Tanzania is party; and
- Facilitating social economic development.

Apart from incorporating sustainable water use principles and having pollution prevention conditionality in the water permits, the Act goes a step further by putting in place a regime water resource protection, abstraction (surface and groundwater) and use. Under Section 33 (1) of the Act, for the whole or part of a water source, a determination of the ecological reserve shall ensure that adequate allowance is made for each aspect of a reserve.

Relevance to the Project

This EIA study will ensure that all relevant potential impacts from the proposed pipeline, for example at river crossings, are properly mitigated to avoid any potential social and environmental problems. The issue of water permits is irrelevant in this project because the issues of abstractions are beyond the scope of this assignment.

The Water Supply and Sanitation Act No. 12 of 2009

This legislation provides for sustainable management and adequate operation and transparent regulation of water supply and sanitation services; provides for establishment of water supply and sanitation authorities as well as community owned water supply organizations; and provides for appointment for service providers. The main aim of this law is to ensure the right of every Tanzanian to have access to efficient, effective and sustainable water supply and sanitation services for all purposes by taking into account among others protection and conservation of water resources and development and promotion of public health and sanitation; and protection of the interest of customers. Under this law, the Minister responsible for water affairs shall establish water authority and cluster water authorities in order to achieve commercial viabilities. The functions and existence of the Dar es Salaam Water and Sanitation Authority (DAWASA), the owner of this project, is therefore regulated by the Water Supply and Sanitation Act.

Relevance to the Project

This pipeline project is the continuation of the GoT / DAWASA efforts to achieve sustainable water supply objectives for Dar es Salaam and its neighboring communities.

The Public Health Act, 2008

Part IV of the Act provides for need to maintain cleanness and hygiene and prevent nuisance during construction works. It calls for effective management of solid, liquid, gaseous, hazardous and gaseous wastes. Section 76 of the Act specifically requires every authority to undertake periodic studies to determine the type of solid and liquid wastes generated from markets, institutions and industries; and determine appropriate methods for sorting and storage of the wastes.

Relevance to the Project

This project will involve a level of waste generation and therefore the EIA study will design waste management activities to be implemented during the implementation of the project.

The Industrial and Consumer Chemical (Management and Control) Act, 2003

The Act provides for among other issues, importation, transportation, storage, use and disposal of chemicals in Tanzania. DAWASCO is required by law to have a certificate from the Chief Government Chemist for importation, storage or disposal of any chemicals. Furthermore, DAWASCO as any other individual dealing with chemical is required to comply with all provisions/regulations regarding packaging, handling, storage, use and disposal of chemicals, as set by the this Act. The minister appoints an inspector from time to time to ensure compliance. Failure to compliance might lead to revocation of the certificate.

Relevance to the Project

This project will involve vehicles and refueling activities which may cause oil spills at some points along the pipeline route. This EIA study will design actions to manage fuel/oil spills or contaminated sites as per to subsection (4) of section 46 of this Act.

The workers Compensation Act no 20 of 2008

The law provides for compensation to employees for disablement or death caused by or resulting from injuries or diseases sustained or contracted in the course of employment; to establish the Fund for administration and regulation of workers compensation and to provide for related matter.

Relevance to the Project

This act is very relevant to this project as workers will be exposed to various hazards during construction of the pipeline and other related facilities.

Dar es Salaam Water and Sewerage (DAWASA) Act, 2001

DAWASA is a public facility responsible for the provision of water and sewerage services in Dar es Salaam. The law establishes and governs DAWASA which is the owner of this project. DAWASA's goals are to provide reliable, affordable and sustainable water supply and sewerage services to all categories of customers in the DAWASA designated areas; and to provide acceptable sewerage services so that public health and protection of the environment are improved in the DAWASA designated areas.

Relevance to the Project

The implementation of the envisaged expansion of the Lower Ruvu Water Treatment Plants will contribute to DAWASA's capacity to attain its goals.

The Urban Planning Act no 8 of 2007

The law provides for the orderly and sustainable development of land in urban areas, to preserve and improve amenities; to provide for the grant of consent to develop land and powers of control over the use of land and to provide for other related matters. Expropriation of land for water infrastructure development and associated activities in urban areas shall comply with the provisions of this law. Under Section 3, among other things, the law seeks to improve level of the provision of infrastructure and social services for sustainable human settlement development.

Relevance to the Project

This project seeks to improve the water supply infrastructure for urban residents of Dar es Salaam and its neighborhood. The provision of this basic social services requirement by this project is in full compliance with the Urban Planning Act.

4.3 International Policy and Legislative Frameworks

Several international financial institutions are taking proactive measures to ensure that the credit they give to countries or private sectors is not negatively impacting the environment. The World Bank Group (including the International Finance Corporation) is guided by a comprehensive set of policies and procedures dealing with the Bank's main development objectives and goals. The "Equator Principles" have become the latest tools guiding lending policies. The Principles were adopted in June 2003 by ten international commercial banks as a voluntary set of guidelines for managing environmental and social issues in project finance lending. They apply to investments with capital costs above US \$ 50 million.

The most appropriate international policy and legal frameworks are summarized below.

4.3.1 The United Nations Convention on Biological Diversity

This Convention, which calls for the sustainable use of biological diversity, was ratified by Tanzania in 1996. The project area has a very low diversity of both flora and fauna. However, mindful of ecological interconnectivity in space and time, best practices of flora and fauna protection will be observed by contractors under supervisions of resident engineers.

4.3.2 Convention on Protection of Workers against Occupational Hazards in the Working Environment Due to Air Pollution, Noise and Vibration

This Convention, ratified by Tanzania in 1984, provides the framework for ensuring a safe working environment for workers. The implementation of the proposed pipeline project will ensure that it prevents the exposure of its workers and the public from any occupational hazards by providing appropriate security and safety equipment.

4.3.3 The World Bank's Safeguard Policies

This EIA has been designed so that all investments under this contract will comply with all the Environmental laws of the United Republic of Tanzania and the Environmental and Social Safeguard Policies of the World Bank. In this chapter, the Bank's safeguards policies and their applicability are discussed.

The World Bank Safeguard Policies are:

- Environmental Assessment (OP4.01, BP 4.01, GP 4.01);
- Natural Habitats (OP 4.04, BP 4.04, GP 4.04) ;
- Forestry (OP 4.36, GP 4.36);
- Pest Management (OP 4.09) ;
- Physical Cultural Resources (OP 4.11);
- Indigenous Peoples (OP 4.10);;
- Involuntary Resettlement (OP/BP 4.12);
- Safety of Dams (OP 4.37, BP 4.37);
- Projects on International Waters (OP 7.50, BP 7.50, GP 7.50);
- Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60);
- In light of the type and location of the proposed development project, the following Bank operational policies will apply;
- Environmental Assessment OP 4.01;
- Involuntary Resettlement OP 4.12; and
- WB Policy on Access to Information.

Environmental Assessment (OP4.01, BP 4.01, GP 4.01)

This policy requires environmental assessment (EA) of projects/programs proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making. The EA is a process whose breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the proposed project. The EA process takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and cultural property) and trans-boundary and global environmental aspects.

The environmental and social impacts will come from the implementation of project's activities by the contractor. The EA process calls for the Government of Tanzania to prepare an Environmental and Social Management Framework report which will establish a mechanism to determine and assess future potential environmental and social impacts during implementation of the project, and then to set out mitigation, monitoring and institutional measures to be taken during operations of these activities, to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels.

The policy further calls for the project as a whole to be environmentally screened to determine the extent and type of the EA process. The EA process for category B projects⁷ examines the potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance. The study team observes that this type of water supply project can be safely classified under the World Bank's Category B projects because it has site specific impacts that can be readily mitigated.

⁷ *The World Bank's Category B projects are likely to have potential adverse environmental impacts on human populations and/or environmentally important areas, including wetlands, forests, grasslands, and other natural habitats, and are less adverse than those of category A projects. Such impacts are site specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for Category A projects. Category A projects are those that are likely to have significant adverse environmental impacts, and may affect an area greater than only the sites or facilities subject to physical works.*

Involuntary Resettlement (OP / BP 4.12)

Significant efforts are to be made in the design and screening stages of projects to avoid impacts on people, land, property, including people's access to natural and other economic resources, as far as possible. Notwithstanding, land acquisition, compensation and resettlement of people seems inevitable for certain type of projects located in certain areas. In order to address the above issues OP 4.12 will be applied to the project as a whole, covering all direct social and economic impacts and includes land acquisition, asset acquisition (homestead, trees, crops, etc.), physical relocation and loss of access to common resources.

This applies to all displaced persons regardless of the total number affected, the severity of the impact and whether or not they have legal title to the land. Particular attention should be paid to the needs of vulnerable groups among those displaced. The policy also requires that the implementation of the resettlement plans are a pre-requisite for the implementation/start of the construction to ensure that displacement or restriction of access does not occur before necessary measures for resettlement and compensation are in place. For chosen sites involving land acquisition, it is further required that these measures include provision of compensation and of other assistance required for relocation, prior to displacement, and preparation and provision of resettlement sites with adequate facilities, where required. In particular, the taking of land and related assets may take place only after compensation has been paid, and where applicable, resettlement sites, new homes, related infrastructure and moving allowances have been provided to displaced persons. For program activities requiring relocation or loss of shelter, the policy further requires that measures to assist the displaced persons are implemented in accordance with the project resettlement plans of action. The policy aims to have the displaced persons perceive the process to be fair and transparent.

This EIA study has abided by the laws of the Government of Tanzania for land acquisition procedures and issues and the World Bank's policy on Involuntary Resettlement OP 4.12. DAWASA had also prepared the Resettlement Policy Framework in 2003 for implementing the Dar es Salaam Water Supply and Sanitation Project, in which a detailed Entitlement Matrix was prepared covering OP 4.12. A preliminary RAP will be prepared under the current consulting services following these guidelines. The Preliminary RAP will benefit from part of RPF and it will be site specific. The Preliminary RAP will have the details of the gaps between the Tanzanian Law and OP 4.12.

Policy on access to information

The World Bank requires that the EIA report must be disclosed as a separate and stand alone document by the Government of Tanzania and the World Bank as a condition for bank Appraisal. The disclosure follows the World Bank's principle of Access to Information (2009). The Reports will be both in English and Swahili language. It will be displayed at all village/ward offices, where it can be accessed by the general public and local communities for review of the common public. This will be kept at one or more convenient locations. Both EIA and Preliminary RAP will be made available in the local language for public review at one or more convenient locations.

The policy further calls for the project as a whole to be environmentally screened to determine the extent and type of the EA process. This infrastructural project has thus been screened and assigned an EA Category B.

Policy on Forests (O.P. 4.36)

OP 4.36 requires that all relevant types of projects must ensure that they avoid causing significant, unmitigated harm to natural forests or other natural habitats. These "do no harm" requirements can be summarized as follows:

- Avoiding significant damage to critical forests and other critical natural habitats. OP 4.36, paragraph 5 prohibits World Bank support for projects that would involve the significant conversion or degradation of critical forests or other types of critical natural habitats. For proposed projects that would adversely affect noncritical forests and other natural habitats, the World Bank's Forests Policy has more flexible (but nonetheless rigorous) standards of compliance. Where feasible, the conversion (loss) or degradation of any forests and other natural habitats should be avoided through careful project siting and design.

This EIA study team will observe this policy requirement fully. However, the field studies have indicated that there will be no any significant conversion or degradation of critical and noncritical natural forests or related ecosystems.

5 STAKEHOLDER CONSULTATION AND PUBLIC PARTICIPATION

5.1 Overview

Stakeholder participation is a cornerstone of any EIA since it ensures that all the interested and affected parties are involved in the project. It also ensures collaboration between the proponent and interested and affected parties throughout all the phases of a project. This section provides a detailed description of the stakeholder engagement process conducted during this EIA exercise. The public consultation process was carried out in accordance with the principles of the Tanzanian Environmental Impact Assessment and Audit Regulation of 2005. These include provision of sufficient and transparent information on an ongoing basis to stakeholders to allow them to comment, and ensuring the participation of historically disadvantaged individuals - women and the youth. Both, the Tanzanian policy and regulatory framework, and World Bank requirements for environment and social safeguards underscore the need for stakeholder involvement in project planning and its execution. Specifically, the Environmental Management Act (EMA, 2004) section 89 and EIA Regulation 17 (URT, 2005) provides details and procedures for public participation and involvement.

The objectives of public consultation process include the following:

- Providing clear and accurate information about the Project (eg. implementation schedule and expected impacts on the biophysical and socio-economic environments) to communities living in the project area, especially the project affected persons along the proposed construction corridor in order to obtain feedback/ valuable suggestions directly from impacted communities;
- Promoting understanding/awareness through the active engagement of individuals, groups, stakeholders, organizations who have a stake in the project and its outcomes and
- Identification of local leaders of who further dialogue can be continued in the subsequent stages of Project implementation.

5.2 Identification of Key Stakeholders

In this EIA study, the levels of stakeholder consultation included:

- Government Ministries and Agencies;
- Utility companies (eg. TANESCO, DAWASA); and
- Local Communities including vulnerable groups along the proposed alignment corridor.

The third stakeholder group above is further sub-divided as follows:

- Kinondoni and Bagamoyo residents;
- Businessmen in the project area;
- Kinondoni Municipal Council and Bagamoyo District Council ;
- Political leaders (Councillors, Ward Chairpersons etc); and
- Religious Organizations.

During the EIA study deliberate efforts were made to include the interests and expectations of all relevant stakeholder groups. Appendix 3 provides the list of people who were consulted during the public meetings, with their signature.

5.3 Public / Stakeholder Involvement

In order to ensure that the aforementioned stakeholder groups participated in public meetings, prior information was communicated through ward governments explaining the necessity of inviting all persons including disabled, women, aged people and youths. The EIA Team first met the village / ward officials and explained to them details of the project. They also informed them that the people inhabiting along the water pipeline corridor need to be consulted. The officials then spread the message and telephonically confirmed dates for meetings. Adequate time was provided to disseminate information about the consultative meeting. In collaboration with respective wards executive

officers in the sampled wards, communities indicated a convenient date, time and venue to convene the various meetings.

Appendix 3 provides a list of people consulted during the consultative process. The participants took interest in the issues and mainly were concerned that there should not be any adverse impact on the residential structures and secondly, they raised the issue of compensation for land acquisition if any, safety issues during construction, among others. These details depict their interest in the project and highlight their needs and concerns. The details of meetings with communities are provided in Appendices 4 and 5. People inhabiting the pipeline corridor, including women participated in large numbers in these meetings, as shown in Appendix 5 in the Photographic records of consultation.

Each public meeting was chaired by the Ward or Village Chairman or Village Executive Officer. The role of the consultant was to moderate the meeting, and the assistant took notes for the minutes of the meeting question and answer sessions took place in the majority of cases until some form of consensus was reached.

The main issues discussed in each meeting are summarized in Table 5.1.

5.4 Consultative Meetings with Government Ministries and Water Authorities

Consultations were held with Water Authorities viz., the Ministry of Water and Irrigation Officials (Director of Water Resources), DAWASA (Director of Human Resources and Public Relations), DAWASCO Officials at Boko, as well as other key informants knowledgeable about the project. The consultations were conducted in the following manner:

- Presentation of the project with a view to creating awareness and understanding the objectives, modalities for implementation and outputs and outcomes of the project;
- Discuss the current water supply situation in Dar es Salaam and communities along the water pipeline in terms of infrastructure, water quantity and water quality, and possible impact of increased water supply or non-intervention;
- Discussing the role of authorities in the management of water resources; and
- Obtaining from the authorities their socio-economic and environmental concerns and perceptions regarding the proposed water supply improvement project.

5.5 Consultative Meeting with Bagamoyo District Council

A Consultative meeting was held at the Bagamoyo District Council office. It involved the District Administrated Secretary and the District Water Engineer.



Plate 5: Consultative Meeting at Bagamoyo District Council

A detailed description was given about the project outlining its alignment, various features and the social and environmental issues. The DAS and DWE representatives made the following comments about the project:

- The NTM should make provision for future water supplies to the Bagamoyo District;
- The NTM should provide fire hydrants;
- The locals should be made aware about the project, its impacts and its scheduling; and
- The construction of the NTM will provide employment for locals.

5.6 Consultative Meeting with Kinondoni Municipality

Consultative meetings at Kinondoni Municipality included the representative of the District Executive Director, and the Community Development Officer.

The agenda for these consultations included:

- Presenting the project;
- Discuss water supply status;
- Discuss the role of authorities in Management of Water Resources;
- Obtaining from authorities their socio-economic concerns and perceptions regarding the proposed water supply improvement; and
- Discuss the role of authorities in public information dissemination monitoring and management plan.

5.7 Consultative Meetings with Community Leaders and Sub-Ward / Village Leadership

In communities where the proposed pipeline corridor is somewhat distant from the community, it was feasible to engage community leadership in discussions to supplement household information. Discussions focused on the following:

- Description of the project;
- Obtain perception of the community regarding the project; and
- Obtain opinions and suggestions from the leadership on their preferred mitigation measures.

Prior to the commencement of the survey work, the EIA team used telephone conversation to provide project details and arrange for the consultative meetings. The Consultant had at least two persons present, one to act as moderator, and other to take notes for the minutes of the meetings.

Agendas for the Ward/Sub-ward and Village consultations included:

- Description of the project;
- Defining the local institutional framework and stakeholders;
- Obtaining from the local population their environmental and socio economic concerns and perceptions regarding the proposed project; and
- Facilitating identification by the communities of the main land uses and land tenure issues along the proposed routing option.

The community leaders raised the following important issues, among others:

- Inconvenience caused with respect to roads, street transportation, electricity and water during the construction period;
- Adequate compensation should be provided for the loss of structures, assets and income
- The new pipeline should be constructed close to the existing pipe;
- Safety of water pipeline;
- Readiness to shift to other areas provided social services are available;

- In case of relocation, adaptation will be difficult for the communities;
- The entire exercise should be well planned and organized professionally to avoid problems; and
- Consultative process should be continued till the time project is completed, in order to address any issue arising at any point of time.

Major issues highlighted by the people in general were related to avoidance of structures while aligning the pipeline, compensation for land acquisition and others assets, safety during the construction period. The concerns of women in the project corridor were related to safety of children during construction, benefits from the project inconvenience caused during the construction due to closure of roads/pathways. A summary of the comments received during these consultations is enclosed as Appendix 6.

Consultations with the community in the project corridor will be a continuous process. Consultations with PAPs are being covered under preliminary RAP. However, the consultations will be conducted during RAP implementation and project construction period.

TABLE 5.1 ISSUES DISCUSSED RELATED TO THE LIKELY PROJECT IMPACTS

Pipeline Section	Village / Sub-Ward	Loss of Land	Loss of Crops	Influx of Work force	Loss of structures	Safety Health	HIV / AIDS	Suggestions
A – B	Kongo, Kiwete, Kerege	Impact on land	Minimal loss	Possible	None	None	Possible	Avoid impact on structures; Use local labour; Give sufficient notice to harvest crops.
B – C	Bunju	Minimal	Minor	Possible	None	Possible	Possible	Compensation at market rate; Safety should accord priority
C – D	Bunju	Minimal	None	Possible	None	Possible	Possible	Avoid structures; Compensation at market rate; Safety should accord priority.
D – E	Boko	Land	None	Possible	Minimal	Possible	Possible	Adequate compensation; Provide safety during construction
E – F	Boko	Land	None	possible			Possible	Safety of women and children; Inconvenience should be avoided.
F – G	Wazo	Possible	None	Possible	Possible but not directly involving DAWASA	Possible	Possible	Safety of women and children; Inconvenience should be avoided.
G – H	Wazo	Possible	None	Possible	Not likely	Possible	Possible	Compensation for loss of land and income; Safety for women and children; Use local labour; Proper marking for DAWASA RoW.
H – I	Salasala	Land	None	Possible	Some minor loss envisaged	Some during construction	Possible	Adequate compensation for land and structure; Inconvenience and problems during construction.
I – J	Salasala	Land	None	Possible	Possible but TANROADS to handle matter	Possible	Possible	Adequate compensation for land and structure; Inconvenience and problems during construction; and Awareness about HIV / AIDS.
J – K	Mbezi	Possible	None	Possible	Possible	Possible	Possible	Avoid impact on shops and structures.
K – L	Mbezi	Possible	None	Possible	Possible	Possible	Possible	Avoid impact on shops and structures.
L – M	Mbezi	Possible	None	Possible	Possible	Possible	Possible	Avoid impact on shops and structures.
M – N	Mbezi Bondeni	Possible	None	Possible	Possible	Possible	Possible	Avoid impact on shops and structures.

Source: Based on Community Consultations in July-August, 2010**Note:** Refer to Figure 3.4 for pipeline sections

6 PROJECT ALTERNATIVES

6.1 The Existing Pipeline

The existing pipeline follows a relatively direct line between the LR WTP and the University storage tanks. For the first 22 km, the existing pipeline runs east through relatively open bush until it intersects Bagamoyo Road, near the village of Kwamatumbi. Between Kwamatumbi and the University storage tanks, the pipeline runs more or less parallel to Bagamoyo Road, to a point about 2 km before the tanks, where it turns away from the road in a south-west direction. Within this approximately 32 km section, the existing pipeline is constructed both inside and outside the TANROADS Right-of-Way (ROW). For the final 2 km, the existing pipeline runs through Lugalo Barracks property before arriving at the University tanks site. Refer to Figure 2.4.

The existing pipeline has a legal entitlement for easement, for the purposes of maintenance and repairs, which extends 5 m from either side of the pipe, making the total width approximately 11.5 m. The easement is in accordance with Act No. 20 of 2001⁸.

Under the DAWASA Act No. 20, the new pipeline will require a similar easement. The initial (default) alignment would be to construct the second pipeline within the existing 11.5 m easement, parallel to the existing pipeline. The main advantage of this approach is that the social impacts, as well as the extent of additional easement required, are minimized. There are other advantages, including minimizing the length of inter-connections and therefore capital cost, reducing inspection and maintenance time and therefore cost, etc.

For the major part of the pipeline route, such a strategy is possible. However, for sections of pipeline located inside TANROADS ROW, there are other factors to consider.

In general, TANROADS ROW contains various utilities and services including electricity (TANESCO), water and sewerage (DAWASA), telephone (TTCL) and other communications providers, gas (eg. SONGAS), etc. For the most part, the various utilities and services lie within a designated strip on one or both sides of the ROW. The existing concrete pipeline, with an outside diameter of approximately 1.5 m occupies a major portion of the available space, making it difficult to construct a second, similar sized pipeline within the same strip.

In addition, the Government of Tanzania, with a grant from the Japanese Government (JICA), intends to upgrade the section of road between Mwenge and Tegeta to dual carriageway, with two lanes on either side. The project will be implemented by TANROADS. Construction is scheduled to begin late 2010 / early 2011. The road widening project presents additional challenges with respect to locating a second pipeline within the TANROADS ROW, in terms of construction scheduling, since it would be undesirable to break-up the newly constructed road in order to install the pipeline.

Finally, there has been significant development along sections of the pipeline since its construction in the 1970s. This has even included several instances of encroachment into the existing DAWASA easement. With respect to TANROADS concerns above, consideration was given to constructing the second pipeline immediately outside the ROW. However, the potential social impact involving relocation of structures and other compensation issues would be significant in some sections. This was considered to be unreasonable for a pipeline construction project.

In light of the foregoing, various alternative pipeline alignments were investigated.

6.2 Alternative Alignments

In the investigation of alternative pipeline alignments, the major issues considered with respect to selecting the optimum (preferred) route include:

- Minimizing the capital cost. In general, this is directly related to length of the pipeline, as well as the degree of difficulty with respect to the construction methods required;

⁸ An Act to make provisions in pursuance of enactment of the Energy and Water Utilities Regulatory Authority Act, 2001 in relation to the functions, powers and privileges of the Dar es Salaam Water and Sewerage Authority; to enhance the regulatory framework for the Dar es Salaam Designated Area; to repeal the Dar es Salaam Water and Sewerage Act, 1981 and to provide for related matters

- Minimizing operating costs. This is primarily related to electricity costs associated with running the pumps, and therefore depends on route selection and topography;
- Minimizing environmental and social impacts, including compensation costs (land and/or structures);
- Technical considerations including the number of bends, the number of air valves and washouts required, accessibility for operations and maintenance, construction difficulty especially related to steep grades and cross-falls, the number of river/stream crossings, the elevation of the ground relative to the hydraulic grade line, the quantity of rock excavation, the corrosion potential of the soils; and
- Minimizing the extent of construction inside TANROADS ROW.

Alternative alignments were investigated for 3 sections of pipeline. These are:

- Bunju “A” Junction to a Point Approximately 1500 m East;
- Wazo Hill Road to University Tanks; and
- Boko Area within TANROADS ROW.

6.2.1 Bunju “A” Junction to a Point Approximately 1500 m East

Three options were explored and subsequently rejected for the reasons described below.

Option A-1

The proposed pipeline alignment would run along the north side of Bagamoyo Road, outside the TANROADS ROW, for approximately 1.5 km before crossing the road and running parallel and adjacent to the existing pipeline.

The north side of the road was selected because the existing concrete pipeline, as well as TANESCO medium voltage power lines, is located on the south side of the road.

The main disadvantage of this option is that there are approximately 16 obstructions along the route, of which 6 are relatively substantial structures, all involving compensation.

Option A-2

The proposed pipeline would cross Bagamoyo Road near the Bunju junction (Minazini), and loop around in a south and east direction, following existing roads, until it reaches the boundary fence of the Wazo Cement Factory property.

The route was selected to follow existing roads / tracks in order to minimize the number of compensation issues. However, in general, the area to the south of Bagamoyo Road is experiencing significant house construction activity, and therefore some level of compensation would be inevitable.

At the upstream end of this option (ie at Bunju junction), it is assumed that a suitable route could be found between the existing pipeline and the dirt road on the south side of Bagamoyo Road, thereby avoiding numerous bends which would be technically unacceptable. A suitable plot was identified; however the property owner would require compensation.

The main disadvantage of this option is the additional length of pipeline and therefore capital cost, as well as the potential for compensation. The alignment is 20% longer than a comparable route running parallel to the existing pipeline. In addition, the alignment involves greater variation in elevation, requiring additional pipeline appurtenances (air valves and washouts).

Option A-3

The initial section of Option A-3 would adopt the same alignment as the initial section of Option A-2. However, instead of following existing roads, Option A-3 would run due east across grasslands with scattered bush and trees, joining the existing pipeline approximately 350 m upstream of Nyakasangwe river.

Notwithstanding the grasslands and bush indicated above, the area contains several on-going house construction projects through which the alignment would pass, and numerous plot monuments are visible. Therefore, some moderate level of compensation is envisaged with this alignment.

The main disadvantage of this option is the potential for compensation, as well as the additional length of pipeline, and the number of appurtenances (air valves and washouts) due to the undulating topography.

Preferred Alignment

Based on the foregoing, the preferred alignment is on the north side of Bagamoyo Road, inside TANROADS ROW, in order to minimize compensation issues and avoid existing utilities.

TANROADS have agreed in principle to this proposal. Refer to Appendix 7.

6.2.2 Wazo Hill Road to University Tanks

Various options were investigated, with the objective of avoiding the congested section of Bagamoyo Road between Interchick factory and Mbezi River, as well as the Salasala area. These were subsequently rejected for the reasons described below.

Option B-1

There is a TANESCO high voltage corridor that runs due north, approximately 3 km west of Bagamoyo Road. In the Salasala area, the corridor turns toward Tegeta and the coast-line where it crosses by means of cable to Zanzibar.

- The TANESCO corridor is approximately 60 m wide, and contains;
- The main high voltage lines, generally located in the centre of the corridor; and
- Two medium voltage lines, one on either side of the corridor.

SONGAS pipeline with its own 30 m easement. For the most part, the SONGAS easement is contained within the TANESCO corridor, thereby occupying up to 50% of the TANESCO corridor width.

The upper sections of the TANESCO corridor (nearest Wazo Cement Factory) were rejected on the basis that the land within the corridor is highly undulating and unsuitable for construction as well as for on-going operation / maintenance of the pipeline.

Therefore, for this option, it was assumed that the new pipeline would run south, parallel to the existing pipeline up to Salasala Road (near Kunduchi junction). From there, the pipeline would be constructed within the paved Salasala Road allowance, west toward the TANESCO corridor. There would be minimal compensation issues within this section of paved road, if any.

The pipeline would subsequently run south for approximately 7-8 km, within the TANESCO corridor, to a point parallel to, but west of, the University tanks. The final section, approximately 2-3 km, between the TANESCO corridor and the tanks, would run east through a relatively congested residential area.

This alignment was rejected for reasons that include:

- The topography near the storage tanks is such that an additional 20 m would be added to the pump head, increasing the power costs by approximately 15-20%. This is unacceptable. In addition, larger pumps would be required, increasing the capital cost;
- The topography is highly undulating with numerous peaks and troughs, with several streams and rivers traversing the section. The undulating nature would require additional air valves, as well as wash-outs;
- For the most part, the magnitude of cross-slope within the TANESCO corridor width is acceptable for construction purposes. However, some sections have narrower ridge-like features with significant cross and side slopes, requiring non-standard design and construction;
- The corridor already contains a SONGAS gas pipeline with its own 30 m easement. This limits the space available for pipeline construction;

- Severe gully erosion is common within the steep sections. Drainage works, erosion protection works, as well as a maintenance road, would be required for the entire 7-8 km length. This would increase construction costs; and
- The residential area between the TANESCO corridor and the storage tanks (at the lower end of this route) is relatively congested, and this would result in a moderate number of compensation issues.

Option B-2

In the section between Interchick and Mbezi River, an alignment was investigated that routed the pipeline through the residential area to the west of Bagamoyo Road.

This alignment was rejected for reasons that include:

- Numerous bends would be required in order to utilize the existing dirt road network. Technically, this is unsatisfactory for a large diameter pipeline;
- Access for operation and maintenance would be less than satisfactory;
- The length of pipeline, as well as the number of fittings would increase, thereby increasing the construction cost; and
- Compensation issues would result, where it was not possible to pass along public roads.

Option B-3

In the section of Bagamoyo Road between Interchick and Mbezi River, an alignment was investigated that routed the pipeline within a 10m strip of land immediately outside the existing TANROADS ROW. Both the east and west sides of the road were investigated. The proposed alignment would pass a variety of structures and lands including single- and multi-storey commercial and residential buildings, industrial buildings, institutional buildings, petrol stations, schools, and a variety of temporary structures (eg. containers, open-sided structures, etc).

The east side of the road has approximately 29 buildings of which 16 are substantial structures. Similarly the west side of the road has 37 buildings of which 25 are considered substantial. It should be further noted that many of the commercial buildings included in the above count, contain multiple shops / businesses, and therefore the number of affected persons is significantly greater than the values indicated.

This alignment was rejected mainly because of the significant social impact and associated compensation costs that would arise.

The option of “zig-zagging” the pipeline in and out of TANROADS ROW in order to avoid the major compensation issues, whilst minimizing construction inside the ROW, was briefly considered but rejected for technical reasons. It is inappropriate for a major pipeline to have multiple, closely positioned 90° bends.

Preferred Alignment

Based on the foregoing, an alignment is proposed that includes the following sections:

- In the Salasala area (between Wazo Hill Road and Interchick; Point H to I on Figure 3.4), construct the second pipeline within the existing easement, parallel to the existing pipeline;
- Between Interchick and a point approximately 2.5 km south, on the Bagamoyo Road, construct the pipeline inside TANROADS ROW on the east side of the road (Point I to J on Figure 3.4). This alignment minimizes social impacts and compensation issues, as well as minimizing interference with the proposed construction corridor for the pending road widening project.
- The east side of the road was selected since the majority of the (relocated) services, including the existing DN 1800 concrete pipeline, run along the west side of the road. In addition, the proposed Mwenge-Tegeta road improvements will mainly take place within the west side of the ROW.
- TANROADS accepted the proposed pipeline alignment in principle. Refer to Appendix 7.
- Between the point approximately 2.5 km south of Interchick and the Mbezi River (Point J to K on Figure 3.4), construct the pipeline immediately outside TANROADS ROW on the west side of the road. This

alignment involves only minimal compensation issues, and eliminates interference with the proposed road widening construction works;

- Between Mbezi River and approximately 700 m before the University storage tanks site (Point K to M on Figure 3.4), construct with pipeline within the existing easement, parallel to the existing pipeline; and
- For the final 700 m (Point M to N on Figure 3.4), construct the pipeline within existing roads to avoid compensation issues along the existing easement in the relatively congested area immediately to the north and east of the tanks site.

6.2.3 Boko Area within TANROADS ROW

The existing pipeline in the Boko area, between points E and H on Figure 3.4, is located inside TANROADS ROW. As discussed previously, the addition of a 2nd large diameter pipeline in the already congested utility corridor within TANROADS ROW was undesirable.

The initial attempt at realignment within this section involved locating the pipe immediately outside TANROADS ROW. However, it was realized that this would result in significant relocation of structures and other compensation issues.

Therefore, an alternative alignment was investigated that involved constructing the pipeline along the eastern property boundary of the TWIGA Cement Factory, located on the west side of Bagamoyo Road.

TWIGA Cement Factory has accepted the proposed pipeline alignment in principle. Refer to Appendix 7.

6.3 “No Project” Alternative

The “No Project” alternative was not considered for the following key reasons:

- The proposed capital investment to expand the LR WTP, financed under the on-going MCC Compact, would be withdrawn, since the increased flow cannot be carried by the existing pipeline alone. Therefore the proposed LR WTP expansion works would not be carried out unless alternative financing could be promptly secured;
- The shortfall between water demand and water supply for Dar es Salaam would continue to increase, due to continued population growth;
- The potential economic growth rate would not be maximized, since new commercial and industrial development projects, that rely on water, may be discouraged from investing;
- The domestic demand would not be fully met, and users will take water from alternative sources, including unsafe sources. Therefore, economic productivity losses due to water related illnesses would remain at current levels, and would in fact tend to increase with increasing population; and
- The overall health and hygiene situation will remain unchanged in the immediate term, due to the unchanged volume of water, and will tend to decrease as the population increases with time.

6.4 Preferred Alignment

A summary of the preferred alignment is presented in Table 6.1. The preferred alignment minimizes the number of compensation issues by adopting the following key strategies:

- Constructing the pipeline within the existing DAWASA easement wherever possible;
- Constructing the pipeline within TANROADS right-of-way, where suitable alternatives cannot be found;
- Constructing the pipeline in new locations where neither of the above two options are possible, for example, along the property boundary of the TWIGA Cement Factory. This involves reaching a suitable agreement with the property owners. Such an agreement in principle has been reached; and
- Avoiding structures by introducing bends in the pipeline. Given the size of the pipeline, this option can only be used sparingly and judiciously.

TABLE 6-1 PROPOSED ALIGNMENT IN PROJECT AREA

Section	From	To	Length (km)	TANROADS	Proposed Alignment	Comment
A-B	WTP	Kerege	22	No	Within existing DAWASA easement	Minimal compensation for land acquisition envisaged
B-C	Kerege	Bunju A Junction	13	No	Within existing DAWASA easement	Some minor encroachment into existing DAWASA easement. Minimal compensation issues envisaged
C-D	Bunju A Junction	Road Crossing (Bagamoyo Rd)	1.5	Yes	Inside TANROADS ROW	TANROADS have provided approval in principle
D-E	Road Crossing (Bagamoyo Rd)	School	4.1	No	Within existing DAWASA easement	Various properties constructed within existing easement. Minor compensation issues envisaged
E-F	School	Cement Factory (North end)	0.3	No	Through school property	School has provided approval in principle
F-G	Cement Factory (North end)	Cement Factory (South end)	2.8	No	Along east perimeter of the Wazo Cement Factory property	Cement Factory has provided approval in principle. There are various squatter type dwellings within the property, some of which would be affected by the proposed alignment. The cement factory is currently undertaking legal proceedings concerning such squatter dwellings. This will require further investigation to determine the true extent of compensation, if any.
G-H	Cement Factory (South end)	Wazo Hill Road	0.6	No	Through industrial area	Industrial area has provided approval in principle
H-I	Wazo Hill Road	Interchick	6.8	No	Within existing DAWASA easement	Some minor encroachment into existing DAWASA easement. Minimal compensation issues envisaged
I-J	Interchick	Road Crossing (Bagamoyo Rd)	1.2	Yes	Inside TANROADS ROW	TANROADS have provided approval in principle
J-K	Road Crossing (Bagamoyo Rd)	Mbezi River	1.1	No	Immediately outside TANROADS ROW	Minimal compensation issues envisaged
K-L	Mbezi River	Turn-off from Bagamoyo Rd	1.5	No	Within existing DAWASA easement	None, or minimal compensation issues envisaged
L-M	Turn-off from Bagamoyo Rd	700m before University Tanks	1.1	No	Within existing DAWASA easement	None, or minimal compensation issues envisaged
M-N	700m before University Tanks	University Tanks	0.7	No	Adjacent to access road to tank site	None, or minimal compensation issues envisaged

7 IMPACT ASSESSMENT AND MITIGATION MEASURES

7.1 General

The proposed project has two distinct phases, namely the construction phase and the operational phase.

For this type of project, the pre-construction activities are minimal and are therefore included in the main construction phase. The construction phase is deemed to end once the proposed works have been tested, commissioned and handed over to the plant operator, DAWASCO.

The operational phase commences upon hand-over to the plant operator, and terminates after the useful life of the plant (the pipeline) has ended and the plant has been suitably de-commissioned.

The main activities involved in both the construction and operational phases are described in Section 2.3.

This section describes the potential environmental and social impacts associated with the activities described above, and the mitigating measures proposed to eliminate the impacts or reduce them to acceptable levels.

7.2 Assessing the Impacts

Section 1.6 describes the manner in which each impact is classified and assessed.

7.3 Summary of the Project Impacts

The project involves the construction and operation of a large diameter buried pipeline.

The pipeline will carry treated (potable) water, ie. non-toxic, non-explosive, non-flammable, non-corrosive liquid. Being a conveyance system only, there are no processes involved, and therefore no by-products, nuisance emissions, or other waste-streams. The operating pressures range from low to medium and the flow velocities are typical for a pressure pipeline of this type.

Since the proposed pipeline is approximately 56.7 km long, the major impact encountered is the potential displacement of persons and/or structures. However this impact has largely been avoided during the design phase of the project through careful selection of the pipeline route. However, for a pipeline of this size, there are other technical factors to be considered in addition to alignment, and therefore some minor disturbance / displacement of structures may occur. Therefore a Resettlement Action Plan (RAP) has been developed prior to the commencement of construction, which identifies the project affected persons, properties and structures, as well as a suitable compensation package for each affected person. The RAP will be implemented by the Government of Tanzania through its implementing agency, DAWASA. The Terms of Reference of the current consulting services include the preparation of a Preliminary Resettlement Action Plan, which is under preparation. Census has been conducted for the impacted assets and the data processing is in progress.

Construction Phase

As described in Section 2.1, the project involves the construction of an underground pipeline and associated appurtenances. For the main part, the pipeline will be constructed within the existing DAWASA easement. Further, there are no environmentally sensitive areas identified along the length of the proposed pipeline.

The proposed works will use conventional and established construction techniques, and will involve full restoration of all excavated surfaces. As such, the short-term construction impacts can be readily mitigated using relatively simple but effective measures, as well as ensuring sound engineering and construction practices.

Construction works will involve conventional, non-toxic materials, including ferrous pipes, function specific valves, and reinforced concrete.

In terms of magnitude, all construction impacts are classified as low impact, implying that the impacts are localized and relatively small scale. Some of the impacts are further lessened by the relatively simple and low intensity construction methods and equipment used for this type of construction.

The duration and frequency of the impacts varies depending on the potential impact under discussion. Some impacts will be continuous for the duration of the construction period, for example noise, whereas others are short

term and low frequency (isolated) occurrences, for example blocking of access or fuel spillage. In addition, it should be noted that the location of the works changes almost daily as the work proceeds. Therefore the location of the impacts and individual receptors (eg. the property owner) also change, implying shorter term impact at each location.

All construction impacts are temporary, where temporary is deemed to include the entire construction period. Further the construction impacts are generally reversible in nature.

The sensitivity of the receptors is low for the project area, meaning that the systems are generally highly adaptable and non-fragile to the potential impacts. There are no highly sensitive environmental areas along the route and, in fact, the pipeline passes through rural settlements and residential areas for much of the route. The pipeline passes through the extreme northern section of the Ruvu North Forest Reserve, for a distance of approximately 7 km. The vegetation in this section is not forest, but rather sparse scrub and grassland. Further, the proposed pipeline will be constructed within the existing DAWASA easement within this Section. The World Bank OP 4.36 (Forests) will not be triggered because there will be no impact on the forest quality and health. The ESIA study team has observed that the proposed project will not have any un-mitigatable harm to the Ruvu North Forest Reserve and its ecosystem functionality.

The probability of occurrence of the construction impacts varies from low, as in the case of accidents and disruption to services, to high (or 100% certainty) in the case of noise from the various construction activities.

Finally, all potential construction impacts can be effectively mitigated, or even eliminated, by the implementation of relatively simple, low cost measures.

The positive benefits derived during construction are considerable, and include rental of properties and buildings, skilled and unskilled employment opportunities for various construction, administrative and other workers, income generating opportunities for local businesses such as hotels, restaurants, bars, fuel suppliers etc, on-the-job training and experience gained with an international contractor, as well as the supply of various construction materials including pipes and fittings, cement, aggregates, and steel reinforcement.

Operational Phase

Being a simple conveyance system carrying potable water, the potential impacts associated with operation are relatively few and minor, and these can be largely mitigated through good design and construction.

In terms of magnitude, the operational impacts are classified as being a low impact, meaning the impacts are local and relatively small scale.

The duration and frequency of the operational impacts are also classified as being low, meaning they are generally short term, and singular events.

The operational impacts are both temporary and permanent. Further, the impacts are generally reversible.

The sensitivity of the receptor systems is low for the entire project area, meaning the systems are generally highly adaptable and non-fragile concerning the impacts, and appropriate mitigation measures can be applied.

Unlike the construction phase, the probability of occurrence of operational impacts is low.

All potential operational impacts can be effectively mitigated by the implementation of relatively simple, low cost measures.

The project is a key component of DAWASA's long term plans for improving water supply to Dar es Salaam and surrounding areas. As such the project will provide safe drinking water to a greater percentage of the population, attract economic investment, and improve the overall health and quality of life in general. These outcomes are all in keeping with the national policy for poverty alleviation and economic growth, and the Government Vision of 2025

The specific positive impacts related to the operation of the pipeline include the additional volume of water available for end users, the general improvement in health and hygiene in the communities, increased revenue for DAWASCO, and increased economic opportunity for existing and new businesses.

7.4 Impacts and Mitigation Measures

Table 8.1 provides a detailed description of the potential impacts, a project specific evaluation of each impact, as well as the proposed mitigation measures.

7.5 Detailed Description of Social Impacts on Properties

While Table 7.1 includes the potential social impact associated with relocation of structures, it provides no detail. Table 8.2 provides details of the likely impact on lands and structures, on a section by section basis.

TABLE 7.1 POTENTIAL IMPACTS AND MITIGATION MEASURES

S/No	Impact	Project Specific Evaluation	Type	Direct / Indirect	Magnitude	Duration	Temp / Perm	Sensitivity	Probability	Mitig. Potential	Proposed Mitigation / Enhancement Measures
	CONSTRUCTION PHASE										
	<u>Positive Impacts</u>										
1	Income from rental of houses and other buildings (by Construction Contractor)	This is a direct economic impact on local property owners with a moderate to high probability of occurrence. The impact is temporary, in that the maximum duration will be the contract period (approximately 2 years)	E	D	L	M	T	-	M/	-	
2	Employment for local labour, skilled and unskilled, secretaries, administrative persons, drivers, security, etc	This is a direct economic impact on the local workforce. It has a high probability of occurrence. Although the impact is temporary, it is likely that most employment opportunities would extend for the duration of the contract period	E	D	L	M	T	-	H	-	
3	Benefits to local businesses, food sellers, restaurants, hotels, bars, shops, particularly fuel suppliers, transporters, and other service providers including electricity, water, telephone, internet,	A direct economic impact on local businesses, with a high probability of occurrence. Although the impact is temporary, it is most probable that the impacts will exist for the duration of the contract period	E	D	L	M	T	-	H	-	

S/No	Impact	Project Specific Evaluation	Type	Direct / Indirect	Magnitude	Duration	Temp / Perm	Sensitivity	Probability	Mitig. Potential	Proposed Mitigation / Enhancement Measures
	security, etc										
5	On job training / skills improvement and gaining work experience	A direct social impact on the local workforce, with a high probability of occurrence, and low to medium magnitude since the work-force may be approximately 100 persons strong. The impact is permanent, since the skills learned and experience gained will remain with the individuals	S	D	L	M	P	-	H	-	
6	Income to suppliers of materials cement, aggregates, pipes, reinforcement, etc	A direct economic impact on local suppliers of construction related materials, with a high probability of occurrence. Although the impact is temporary, it is most probable that it will prevail for the duration of the contract period	E	D	L	L	T	-	H	-	
	<u>Negative Impacts</u>										
1	Displacement of persons and structures	A direct social-economic impact on local property owners. The probability of occurrence is low. The impact is permanent. The (relative) magnitude of the impact may vary depending on the socio-economic status of the individuals, and the nature of the impact, eg. land only, structure, loss of income, or a combination thereof. High probability of mitigation through careful selection of pipeline route	S/E	D	L	H	P	L	L	H	<ul style="list-style-type: none"> • Selection of pipeline route to minimize displacement • Develop RAP before commencement of construction • Make appropriate compensation payments in accordance with Tanzanian and World Bank policy frameworks
2	Increased soil erosion	A temporary, direct physical impact.	P	D	L	L	T	L	L	H	<ul style="list-style-type: none"> • Minimize extent of vegetative • Backfill immediately upon

S/No	Impact	Project Specific Evaluation	Type	Direct / Indirect	Magnitude	Duration	Temp / Perm	Sensitivity	Probability	Mitig. Potential	Proposed Mitigation / Enhancement Measures
	resulting from clearing of vegetative cover and removal of topsoil	Localized in nature, being limited to the width of the working corridor. Low to medium probability of occurrence, particularly during rainy season. High probability of mitigation through relatively simple but effective measures.									<ul style="list-style-type: none"> clearance and topsoil removal Limit length of trench open at one time Minimize storm drainage entering and flowing in trenches
3	Erosion, washout of excavated soils	A temporary, direct physical impact. Localized in nature. Low to medium probability of occurrence, particularly during rainy season. Generally short term in duration since excavations are backfilled as the work proceeds. High probability of mitigation through relatively simple but effective measures.	P	D	L	L	T	L	L/	H	<ul style="list-style-type: none"> installation of pipe Proper reinstatement to re-establish plant growth and stabilize soil to prevent erosion Proper stockpiling of materials Protective covers (eg tarpaulins) to prevent loss and degradation Limit the time of keeping excavations open to a minimum Do not place excavated materials in drainage routes Provide drainage away from trench and stockpiles Provide silt fences / straw bales as necessary Manage dewatering and discharge point Backfill immediately upon installation of pipe
4	Removal of trees and other flora ⁹	A temporary, direct biological impact. Localized in nature, being limited to the width of the working corridor. Low probability of occurrence due to proposed location of pipeline. Low magnitude as route passes through sparsely vegetated locations. High probability of mitigation through replanting measures.	B	D	L	L	T	L	L	H	<ul style="list-style-type: none"> Selection of route to avoid forest areas Minimize number of trees removed during construction Re-plant trees / shrubs as necessary Limit vegetation removal to areas delineated in drawings and other contract documents
5	Dust	A temporary, direct physical impact. Localized in nature, being limited to area adjacent to the working corridor. Low to medium probability of occurrence,	P	D	L	L	T	L	L/	H	<ul style="list-style-type: none"> Apply water to dry / dusty surfaces Dust masks for laborers Fine particle materials should be Limit hours of work near dwellings Concrete batching / mixing equipment to be well sealed

⁹ The owner of land from which trees are removed will be given the option to either retain the wood for his own use or to have the contractor remove it from his/her land.

S/No	Impact	Project Specific Evaluation	Type	Direct / Indirect	Magnitude	Duration	Temp / Perm	Sensitivity	Probability	Mitig. Potential	Proposed Mitigation / Enhancement Measures
		particularly during dry season. Magnitude and duration of impact is low, and mainly attributable to movement of infrequent delivery trucks. High probability of mitigation									<ul style="list-style-type: none"> enclosed and covered, eg by tarpaulins Trucks shall be fitted with covers to prevent material windblown losses Limit speed of construction vehicles Complying with Air quality, soil quality and water quality standard regulations, of 2007.
6	Noise	A temporary, direct physical impact. Localized in nature, being limited to the area adjacent to the working corridor. High probability of occurrence, given the use of mechanical equipment. Magnitude is expected to be relatively low and non-percussive, although continuous during working hours. High probability of mitigation	P	D	L	M	T	L	H	H	<ul style="list-style-type: none"> Provide and maintain proper mufflers on contractor's plant and equipment Limit hours of work to daylight hours near dwellings Complying with Air quality, soil quality and water quality standard regulations, of 2007 Provide ear protectors for workers Monitor noise and vibration levels
7	Exhaust emissions	A temporary, direct physical impact. Localized in nature, being limited to the area adjacent to contractor's plant and equipment. Medium probability of occurrence, given the use of mechanical equipment driven by diesel and petrol engines. Magnitude is expected to be relatively low given the relatively few pieces of equipment on site, although more or less continuous during working hours. High probability of mitigation	P	D	L	M	T	L	M	H	<ul style="list-style-type: none"> Provide and maintain proper exhaust systems on contractor's plant and equipment Maintain and tune engines of contractor's plant and equipment Complying with Air quality, soil quality and water quality standard regulations, of 2007 Limit hours of work near dwellings Monitor emission levels

S/No	Impact	Project Specific Evaluation	Type	Direct / Indirect	Magnitude	Duration	Temp / Perm	Sensitivity	Probability	Mitig. Potential	Proposed Mitigation / Enhancement Measures
8	Vibration resulting from compaction and other equipment	A temporary, direct physical impact. Localized in nature, being limited to the area immediately adjacent to the operating equipment. High probability of occurrence, given the need for proper compaction of backfill material. Magnitude is expected to be relatively low given the type of equipment to be used and need not to damage the pipe. Duration is more or less continuous during working hours. High probability of mitigation	P	D	L	M	T	L	H	H	<ul style="list-style-type: none"> • Ensure properly maintained equipment, in particular isolators • Conduct pre-inspection of adjacent structures, including buildings, walls, towers, utilities • Ensure adequate setback of materials / plant from excavations / holes to prevent movement and fall-in • Residents to be notified in advance of possible vibrations prior to commencing the activity
9	Fuel spillage	A temporary, direct physical impact. Localized in nature, being limited to the area immediately adjacent to fuel filling area. Low probability of occurrence, given the size and relatively few pieces of equipment on site. Magnitude is expected to be low considering the relatively small volumes of fuel involved. High probability of mitigation through relatively simple but effective measures.	P	D	L	L	T	L	L	H	<ul style="list-style-type: none"> • Designated fuel filling sites • Secondary containment of tanks • Immediate remediation of soil if spill occurs • Use of drip pans if any fueling of construction equipment will occur outside of fuel filling sites • Advance provision of spill control materials at all fuelling or vehicle maintenance locations • Complying with Air quality, soil quality and water quality standard regulations of 2007
10	Disturbance to vehicular and pedestrian traffic caused by working in /	A temporary, direct social impact. Localized in nature, being limited to the immediate area of the construction activity. Medium to	S	D	L	L	T	L	M/	H	<ul style="list-style-type: none"> • Provide suitable diversions • Provide adequate signs and flagmen • Detailed method statements and pre-works preparations for road crossings, including checking

S/No	Impact	Project Specific Evaluation	Type	Direct / Indirect	Magnitude	Duration	Temp / Perm	Sensitivity	Probability	Mitig. Potential	Proposed Mitigation / Enhancement Measures
	near roads, and crossing roads ¹⁰	high probability of occurrence, since the pipeline passes through some relatively built-up sections. Magnitude is expected to be high but relatively short-term. High probability of mitigation through implementation of a suitable Traffic Management Plan.									<ul style="list-style-type: none"> • Provide public notices / announcements • Safety barriers / tape around excavations • Traffic cones • Prepare and implement a Traffic Management Plan¹¹ • Minimize road restrictions during non-working hours • Provide adequate signage, lighting or physical barriers
11	Blocking access to properties	A temporary, direct social impact. Localized in nature, being limited to the properties temporarily affected by the construction activities. Medium to high probability of occurrence, as the construction activity passes the properties. Magnitude and duration are expected to be low and of relatively short-term. High probability of mitigation through simple measures.	S	D	L	L	T	L	M/	H	<ul style="list-style-type: none"> • Maintain temporary access to dwellings and commercial properties • Advance notice to occupants
12	Risk of Accidents / Injuries to workers	A temporary, direct social impact, specifically concerning the workers. Low probability of occurrence. High probability of mitigation through simple but effective	S	D	L	L	T	L	L	H	<ul style="list-style-type: none"> • Health & Safety (H&S) training • Specific training for job to be done, especially equipment use • Proper certification of skilled

¹⁰ Impact ratings include any negative impacts from both the projected level of construction traffic and the anticipated road restrictions or closures due to construction.

¹¹ The Traffic Management Plan should include adequate provisions for traffic and pedestrian safety near construction areas during non-working hours such as nights and week-ends.

S/No	Impact	Project Specific Evaluation	Type	Direct / Indirect	Magnitude	Duration	Temp / Perm	Sensitivity	Probability	Mitig. Potential	Proposed Mitigation / Enhancement Measures
		measures.									<ul style="list-style-type: none"> personnel • Compulsory use of protective / safety equipment and clothing • Maintenance / inspection / testing of equipment • Implement safety rules • Prepare site specific H&S Management Plan • Pro-active H&S managers (contractor) • Adequate supervision • Strict compliance with work methods / no short cuts, eg shoring of trenches as and when required behavior • Adequate first aid equipment on site • Persons trained in basic first aid • Workers in work sites only on a need-to-be basis. Casual on-lookers removed from immediate work site • Alarms / horns on equipment (especially when reversing) • Provide adequate lighting for night-time works • Maintain work sites / food preparation, eating areas in hygienic condition
13	Risk of Accidents / Injuries to general public	A temporary, direct social impact, specifically concerning the general public. Low probability of occurrence. High probability of mitigation through simple but effective measures.	S	D	L	L	T	L	L	H	<ul style="list-style-type: none"> • Provision of safety barriers / warning tape • Signs (local language) • Public notices / awareness • Strict no-go zone around excavations • Minimize time that excavations are left open • Minimize length of excavations open at one time • Provide security at night • Close down work sites properly at night time • Provide lights / works lanterns as necessary • Ensure de-watering pump discharge is not affecting buildings, properties • Ensure proper use of contractor's plant and equipment by experienced and qualified operators

S/No	Impact	Project Specific Evaluation	Type	Direct / Indirect	Magnitude	Duration	Temp / Perm	Sensitivity	Probability	Mitig. Potential	Proposed Mitigation / Enhancement Measures
14	Disruption of water service during connections	A temporary, direct social impact. High probability of occurrence, since the connections must be made, however the number of connections is limited to approximately 6 only. The duration of the impact is short term. High probability of mitigation	S	D	L	L	T	L	H	H	<ul style="list-style-type: none"> Notification to users Minimize duration that the contractor is allowed to carry out tie-in works / work during night if necessary Backup plans Detailed method statements Pre-connection works and activities, checklists
15	Inadequate / improper disposal of pressure test water	A temporary, direct physical impact with low probability of occurrence. Generally a short term, low magnitude, single frequency occurrence for individual section of pipeline. High probability of mitigation	P	D	L	L	T	L	L	H	<ul style="list-style-type: none"> Transfer section to section if feasible Suitable discharge point / stream, river avoiding scour Carry the water by tanker to a suitable disposal point
16	Inadequate / improper disposal of chlorinated water	A temporary, direct physical impact with low probability of occurrence. Generally a short term, low magnitude, single frequency occurrence for individual section of pipeline. High probability of mitigation	P	D	L	L	T	L	L	H	<ul style="list-style-type: none"> Treat with neutralizing chemicals Carry the chlorinated water by tanker to a suitable disposal point
17	Inadequate / improper disposal of excess / waste construction materials	A temporary, direct physical impact with low probability of occurrence. Generally a short term, low magnitude, but more or less continuous occurrence throughout the contract period. High probability of mitigation through implementation of Waste Management Plan	P	D	L	M	T	L	L	H	<ul style="list-style-type: none"> Disposal in official dump sites Handling and disposal of wastes in accordance with Waste Management Plan Collection on site in designated bins / waste storage containers Re-use / re-cycle materials
18	Inadequate / improper disposal of sanitary wastes	A temporary, direct physical impact with low probability of occurrence. Continuous, low magnitude, repeated occurrence for	P	D	L	M	T	L	L	H	<ul style="list-style-type: none"> Provide portable latrines at all work sites Maintain latrines and empty Prepare and implement Environmental Management Plan including sanitary waste disposal

S/No	Impact	Project Specific Evaluation	Type	Direct / Indirect	Magnitude	Duration	Temp / Perm	Sensitivity	Probability	Mitig. Potential	Proposed Mitigation / Enhancement Measures
		duration of contract. High probability of mitigation									measures
19	Increased risk of HIV / STD among local communities	A direct social impact with low to medium probability of occurrence. Continuous impact for duration of contract. High probability of mitigation through relatively simple but effective measures.	S	D	L	L	T	L	L/	H	<ul style="list-style-type: none"> • Design and implement an HIV / AIDS awareness training programme • Participation of workers and communities in an HIV / AIDS awareness training programme. Contractor to allow and encourage participation; • Use local NGOs and CBOs to inform the neighboring communities about the HIV/Aids spread/status <ul style="list-style-type: none"> • Provide condoms • Sensitize workers on STD issues • Zero tolerance of inappropriate behavior • Medical check-ups
20	Improper behavior / conduct on site and in communities	A temporary, direct social impact with low probability of occurrence. High probability of mitigation	S	D	L	L	T	L	L	H	<ul style="list-style-type: none"> • Strict disciplinary action - zero tolerance • Drinking / drugs on site not tolerated <ul style="list-style-type: none"> • Sensitize workers about behavior as a visitor in the community
21	Temporary disturbance of crops / structure (walls, fences etc) during construction	A direct social-economic impact on local property owners. The impact is temporary. The probability of occurrence is low to medium. The (relative) magnitude of the impact may vary depending on the socio-economic status of the individuals, and the magnitude of the impact. High probability of mitigation	S/E	D	L	L	T	L	L/	H	<ul style="list-style-type: none"> • Compensation. The RAP will be used as a basis for compensation • Reinstatement to equal or better • Supervision of reinstatement works <ul style="list-style-type: none"> • Open dialogue with owner • Prior documentation of affected crop / structure etc
22	Disturbance of existing	A temporary, direct physical impact with	P	D	L	L	T	L	L/	H	<ul style="list-style-type: none"> • Avoid accidental entry of materials <ul style="list-style-type: none"> • Minimize extent of disruption of

S/No	Impact	Project Specific Evaluation	Type	Direct / Indirect	Magnitude	Duration	Temp / Perm	Sensitivity	Probability	Mitig. Potential	Proposed Mitigation / Enhancement Measures
	rivers and water courses during construction	low to medium probability of occurrence. Short term, low magnitude, single occurrences. High probability of mitigation									<ul style="list-style-type: none"> into existing streams and water courses banks and river beds • Incorporate appropriate river bed / river bank protection works to prevent erosion • Replant grasses and vegetation to stabilize banks • Method statement prior to commencing works • Appropriate diversion of flow around works • Schedule works for dry periods of low flow
23	Disturbance of existing utilities and services	A temporary, direct social impact with low probability of occurrence. The risk of the impact at each section will continue through the excavation and installation activities. High probability of mitigation	S	D	L	L	T	L	L	H	<ul style="list-style-type: none"> • Consult utilities / authorities prior to construction to confirm location of existing infrastructure and services • Provide adequate support / protection in accordance with the authority's instruction • Ensure supervision by utility / service providers • Mark (physically) the location of any underground utilities • Provide adequate advance notice to users in case of utility / service shut-down • Ensure all workers are aware of presence and location of services / utilities
	OPERATIONAL PHASE										
	<u>Positive Impacts</u>										
1	Additional water conveyed to DSM and surrounding communities	This is a direct social impact on the entire service area. The impact is permanent. The pipeline will carry 50% additional volume of water, therefore the magnitude is deemed medium to high	S	D	M/	H	P	-	H	-	<ul style="list-style-type: none"> • Implement water usage / wastage programs to coincide with increase availability of water

S/No	Impact	Project Specific Evaluation	Type	Direct / Indirect	Magnitude	Duration	Temp / Perm	Sensitivity	Probability	Mitig. Potential	Proposed Mitigation / Enhancement Measures
2	General improvement in health and hygiene of communities	This is an indirect social impact on the entire service area. The impact is permanent.	S	I	M	H	P	-	H	-	<ul style="list-style-type: none"> Implement health and hygiene programs to coincide with increase availability of water
3	Additional revenue for DAWASA / DAWASCO	This is a direct economic impact for DAWASCO. The impact is permanent.	E	D	M/	H	P	-	H	-	<ul style="list-style-type: none"> DAWASCO to implement a water usage / wastage program to coincide with increase availability of water DAWASCO to implement leak detection / repair programs to reduce losses and maximize revenue
4	Increased economic opportunities, especially for businesses that demand water	This is an indirect social-economic impact on the entire service area. The impact is permanent.	E	I	M	H	P	-	H	-	
	<u>Negative Impacts</u>										
1	Pipeline bursts	A temporary, direct physical / social impact with low probability of occurrence. Generally a short term, single frequency occurrence at an individual location within the pipeline. High probability of mitigation through various measures	P/S	D	L	L	T	L	L	H	<ul style="list-style-type: none"> Implement regular monitoring and maintenance program Adequate design Good construction and testing Special design / construction at key locations, eg road crossings etc Adequate stock of repair kits available for immediate use Emergency response action plan for major bursts Easement, allowing immediate access to pipeline Public encouraged to report leaks / bursts
2	Flooding risk during intermittent flushing of pipelines	A temporary, direct physical / social impact with low probability of occurrence. Generally a short term, single frequency occurrence at known locations along the pipeline. High probability of mitigation	P/S	D	L	L	T	L	L	H	<ul style="list-style-type: none"> Discharge directed to existing watercourse or stream Advance notification to public (if necessary) Limit duration of washout activity

S/No	Impact	Project Specific Evaluation	Type	Direct / Indirect	Magnitude	Duration	Temp / Perm	Sensitivity	Probability	Mitig. Potential	Proposed Mitigation / Enhancement Measures
3	Theft / Vandalism of infrastructure	A permanent, indirect social impact with low probability of occurrence. Generally single frequency occurrences. High probability of mitigation	S	I	L	L	P	L	L	H	<ul style="list-style-type: none"> • Provide and maintain covers and locks • Regular inspection of assets
4	Scour of soils from use of washouts	A permanent, direct physical impact with low probability of occurrence. Generally a short term, single frequency occurrence at known locations along the pipeline. High probability of mitigation	P	D	L	L	P	L	L	H	<ul style="list-style-type: none"> • Adequate design of washout facility • Monitor and arrange for remediation as necessary

NOTES

- Type of Impact: **(P)**hysical **(B)**iological **(S)**ocial / Cultural **(E)**conomic
- (D)**irect or **(I)**ndirect Impact;
- Magnitude: Regional / large scale - **(H)**igh Sub-Regional / moderate - **(M)**edium Local / small - **(L)**ow;
- Duration: Long term / Frequent - **(H)**igh Medium Term / Frequent - **(M)**edium Short term / Infrequent - **(L)**ow
- (T)**emporary or **(P)**ermanent impact
- Sensitivity: Fragile / Low adaptability systems - **(H)**igh Predictable / Adaptable systems - **(M)**edium Non-fragile systems / Predictable / Highly adaptable - **(L)**ow
- Probability: Occurrence is highly likely - **(H)**igh Occurrence is likely but with degree of uncertainty - **(M)**edium Occurrence is highly unlikely - **(L)**ow
- Potential for Mitigation: High potential / minimum effort and cost - **(H)**igh Good potential / moderate effort - **(M)**edium None or low potential / Costly - **(L)**ow

TABLE 7.2 POTENTIAL IMPACTS ON PROPERTIES AT SECTIONS ALONG THE PIPELINE

Section	Village/Sub-Ward	Agriculture Land	Structures	Common Property	Comments on Impact	Mitigation
A – B	Kongo, Buma, Matimbwa, Kwamatumbi Kerege	24 land owners	None	None	Land to be acquired for easement of proposed pipeline	Adequate compensation for land for easement
B – C	Kerege, Mapinga, Bunju	26 land owners	Approx. 5 structures	None	Structures fall within existing easement	Adequate compensation for land for easement
C – D	Bunju “A”	None	None	None	None	Construct inside TANROADS ROW
D – E	Road Crossing Bag Rd – Primary school	None	Approx. 17 low cost structures	None	Land to be acquired for easement of proposed pipeline	Adequate compensation for structures and land for easement
E – F	Nyakasanga Pr. School - Cement Factory, North end	None	None	School land	None	Negotiated agreement with government school
F – G	Cement Fact. North End—Cement Fact. South End	None	4-5 squatter structures	None	None	Negotiated agreement with Cement Factory. Compensation for structures
G – H	Cement Fact. South End - Wazo Hill Rd	None	None	None	None	None. Align new pipeline in public road
H – I	Wazo Hill Rd - Interchick	None	30-35 structures	None	Structures mainly fall within existing easement; Land to be acquired for easement	Compensation for land and structure, and land for easement
I – J	Interchick - Road crossing Bag.Rd	None	None	None	None	Construct inside TANROADS ROW
J – K	Road crossing Bag.Rd - Mbezi River	None	2 structures	None	Structures fall within existing easement	Compensation for land and structure, and land for easement
K – L	Mbezi River—Turn off from Bag. Rd	None	None	None	None	None. Negotiated agreement with Lugalo Barracks
L – M	Turn off from Bag. Rd - 700m before Univ. Tanks	None	None	None	None	None. Negotiated agreement with Lugalo Barracks
M – N	700m before Univ. Tanks to Univ. Tanks	None	None	None	None	None

Source: Transect Walk August 2010**Note:** Refer to Figure 3.4 for Section identification

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

8.1 General

The purpose of the Environmental and Social Management Plan (ESMP) is to describe the mitigating actions to be taken, during the various project phases, in order to ensure that the identified potential impacts will be eliminated, or reduced to acceptable levels. The ESMP also identifies the relevant responsible authorities, and identifies the source of funds required to implement the requirements of the ESMP.

The ESMP addresses the mitigation measures required during the construction and operation phases of the project. However, it is important to recognize that various mitigation measures have already been incorporated into the engineering designs. For example, the final pipeline route was selected with the specific objective of minimizing disturbance to existing structures and properties. Other examples include river bank protection works for river crossings, as well as the numerous clauses included in the General and Particular Specifications, describing how the contractor shall carry out the works with the objective of minimizing (or eliminating altogether) the various environmental and social impacts.

Notwithstanding the above, it is recognized that for a large diameter, primary pipeline such as this, alignment is not the only issue, and cost (capital and operating cost), as well as various technical factors, must also be considered.

During the field studies, it became apparent that, since construction of the original pipeline in the 1970s, there has been encroachment into the existing pipeline easement at various sections, notably Boko and Salasala. For the most part, such encroachment is limited to boundary fences / walls and low-cost structures / containers, used mainly for vending and other small businesses.

Therefore, while the proposed pipeline route eliminates relocation of major structures, there will be some minor relocation or reinstatement issues concerning private property. A separate preliminary Resettlement Action Plan will be prepared under the project that will provide an estimation of such compensation costs.

In addition, as noted in Section 6.1, the new pipeline will have associated with it a 10 m easement, in accordance with DAWASA Act No. 20. This legal requirement will also require compensation costs that will be identified in the preliminary Resettlement Action Plan.

8.2 Responsible Parties

The Proponent (DAWASA) of the project will be ultimately responsible for fulfilling the requirements of EMA 2004 (Tanzania's Environmental Legislation), including Environmental Audits. The implementation of the specific requirements will largely be carried out by the contractor (during construction), and DAWASA's plant operator (DAWASCO) during the operational phase. DAWASA will hire the services of a Construction Supervisor to ensure compliance during construction phase.

The parties responsible for implementing the ESMP are described in Table 8.1.

Given the nature of the proposed infrastructure, the potential impacts associated with the operational phase of the project are relatively minor. Therefore, as indicated in Section 7, the majority of the impacts relate to short-term construction impacts. Many of these can be eliminated, or readily managed, by adopting sound construction practices. The responsibility for implementing the necessary mitigation measures lies primarily with the contractor, and the construction supervisor (who represents the proponent, DAWASA) shall ensure that such standards and practices are followed.

The contractor will be required to provide at the project site an Environmental and Social Manager, as well as a Health and Safety Manager. These experts will have the relevant qualifications, background and experience in similar projects, and shall be responsible for implementing the final version of the ESMP and Health and Safety plans. Preferably, the experts will possess a degree in environmental management or ecology, as well as at least 3 years practical experience on similar assignments.

For a project of this magnitude, it is expected that the successful bidder (ie. the contractor) will have established Quality Management Manuals which will include relevant sections on environmental and social management, as

well as health and safety procedures and plans. However, at all times, the requirements specified in the Contract Documents will take precedence and guide the preparation of the Plans. These requirements are reflected in the document *MCA-T Requirements on Contractor's Site-Specific ESMP and HSMP* (May 2010).

The Contractor will be familiar with all relevant national and international policies, acts and other statutory requirements, and shall comply in full with each of these.

The contractor shall be expected to conduct periodic trainings and information workshops such that all workers are familiar with, and practice, the requirements of the ESMP and Health and Safety plans.

TABLE 8.1: ESMP – RESPONSIBLE PARTIES

SN	Responsible Party	Comment
1	Govt. of Tanzania	Compensation funds provided by GOT
2	DAWASA	Prepares and implements final compensation plan based on preliminary Resettlement Action Plan. Implementation of the final compensation plan will be funded through the current Implementing Entity contract between DAWASA and MCA-T
3	Contractor	The Contractor will prepare a detailed ESMP, based on the framework described in this section. The cost of implementing the mitigation measures associated with constructing the works, including skilled personnel, will be included in the contractor's unit rates
4	Construction Supervisor (Resident Engineer)	The Construction Supervisor (representing the proponent, DAWASA) will ensure that the ESMP and the individual mitigating measures described therein are implemented. The staffing and other resources required by the Construction Supervisor for the purpose of overseeing the implementation of the ESMP will be included in the services contract, yet to be entered into, between the between MCA-T and the Construction Supervisor
5	DAWASCO	Will update and implement their existing operation and maintenance plans to include the new infrastructure, and assign officers to carry out the necessary actions. Implementation of the operation and maintenance plan will be funded through DAWASCO's operations budget which is partly funded by revenue generated from the sale of water

8.3 Environmental and Social Management Plan

The Environmental and Social Management Plan is presented in Table 8.2

The social aspect includes the preparation of Preliminary Resettlement Action Plan, which deals with the identification of potential impacts and PAPS; socio-economic profile of PAPs, legal and institutional framework, resettlement framework and entitlement matrix, consultations with stakeholder, compensation and assistance, organizational framework, grievance redress mechanism, monitoring and Evaluation and resettlement budget.

TABLE 8.2: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

SN	Impact	Proposed Mitigation	Source of Mitigation Funds	Responsible Party
CONSTRUCTION PHASE				
1	Land acquisition of 5 meter along the existing line, partial impact on residential structures and temporary shops	<ul style="list-style-type: none"> • Preparation of Preliminary RAP and implement it before the commencement of the construction • Make appropriate compensation payments in accordance with Tanzanian and World Bank policy frameworks • Payment of all compensation and assistance before construction 	<ul style="list-style-type: none"> • Based on fair market value of assets 	<ul style="list-style-type: none"> • Govt of Tanzania • DAWASA
2	Increased soil erosion resulting from clearing of vegetative cover and removal of topsoil	<ul style="list-style-type: none"> • Minimize extent of vegetative clearance and topsoil removal • Limit length of trench open at one time • Minimize storm drainage entering and flowing in trenches • Backfill immediately upon installation of pipe • Proper reinstatement to re-establish plant growth and stabilize soil to prevent erosion 	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor
3	Erosion, washout of excavated soils	<ul style="list-style-type: none"> • Proper stockpiling of materials • Protective covers (eg tarpaulins) to prevent loss and degradation • Limit the time of keeping excavations open to a minimum • Do not place excavated materials in drainage routes • Provide drainage away from trench and stockpiles • Provide silt fences / straw bales as necessary • Manage dewatering and discharge point • Backfill immediately upon installation of pipe 	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor
4	Removal of trees and other flora	<ul style="list-style-type: none"> • Selection of route to avoid forest areas • Minimize number of trees removed during construction • Re-plant trees / shrubs as necessary • Limit vegetation removal to areas delineated in drawings and other contract documents 	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor
5	Dust	<ul style="list-style-type: none"> • Apply water to dry / dusty surfaces • Dust masks for laborers • Fine particle materials should be enclosed and covered, eg by tarpaulins 	<ul style="list-style-type: none"> • Included in Works contract • Construction 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor

SN	Impact	Proposed Mitigation	Source of Mitigation Funds	Responsible Party
		<ul style="list-style-type: none"> • Limit speed of construction vehicles • Limit hours of work near dwellings • Concrete batching / mixing equipment to be well sealed • Trucks shall be fitted with covers to prevent material windblown losses 	Supervisor's contract	
6	Noise	<ul style="list-style-type: none"> • Provide and maintain proper mufflers on contractor's plant and equipment • Limit hours of work to daylight hours near dwellings. Complaints should be subject to a complaints management system that provides for investigation of the complaint, such that remedial action can be taken • Provide ear protectors for workers • Monitor noise and vibration levels 	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor
7	Exhaust emissions	<ul style="list-style-type: none"> • Provide and maintain proper exhaust systems on contractor's plant and equipment • Maintain and tune engines of contractor's plant and equipment • Limit hours of work near dwellings • Monitor emission levels 	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor
8	Vibration resulting from compaction and other equipment	<ul style="list-style-type: none"> • Ensure properly maintained equipment, in particular isolators • Conduct pre-inspection of adjacent structures, including buildings, walls, towers, utilities • Ensure adequate setback of materials / plant from excavations / holes to prevent movement and fall-in • Residents to be notified in advance of possible vibrations prior to commencing the activity 	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor
9	Fuel spillage	<ul style="list-style-type: none"> • Designated fuel filling sites • Secondary containment of tanks • Immediate remediation of soil if spill occurs 	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor
10	Disturbance to vehicular and pedestrian traffic caused by working in / near roads, and crossing roads	<ul style="list-style-type: none"> • Provide suitable diversions • Provide adequate signs and flagmen • Provide public notices / announcements 	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor

SN	Impact	Proposed Mitigation	Source of Mitigation Funds	Responsible Party
		<ul style="list-style-type: none"> • Safety barriers / tape around excavations • Traffic cones • Prepare and implement a Traffic Management Plan • Detailed method statements and pre-works preparations for road crossings, including checking materials, plant, consumables • Notification of traffic police and other authorities 		
11	Blocking access to properties	<ul style="list-style-type: none"> • Maintain temporary access to dwellings and commercial properties • Advance notice to occupants • Minimize duration of blocking access through proper planning of works 	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor
12	Risk of Accidents / Injuries to workers	<ul style="list-style-type: none"> • Health & Safety (H&S) training • Specific training for job to be done, especially equipment use • Proper certification of skilled personnel • Compulsory use of protective / safety equipment and clothing • Maintenance / inspection / testing of equipment • Implement safety rules • Prepare site specific H&S Management Plan • Pro-active H&S managers (contractor) • Adequate supervision • Strict compliance with work methods / no short cuts, eg shoring of trenches as and when required • Enforce compliance with Occupational H&S Act • Adopt best engineering practices • Zero tolerance of improper behavior • Adequate first aid equipment on site • Persons trained in basic first aid • Workers in work sites only on a need-to-be basis. Casual on-lookers removed from immediate work site • Alarms / horns on equipment (especially when reversing) 	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor

SN	Impact	Proposed Mitigation	Source of Mitigation Funds	Responsible Party
		<ul style="list-style-type: none"> • Provide adequate lighting for night-time works • Maintain work sites / food preparation, eating areas in hygienic condition 		
13	Risk of Accidents / Injuries to general public	<ul style="list-style-type: none"> • Provision of safety barriers / warning tape • Signs (local language) • Public notices / awareness • Strict no-go zone around excavations • Minimize time that excavations are left open • Minimize length of excavations open at one time • Provide security at night • Close down work sites properly at night time • Provide lights / works lanterns as necessary • Ensure de-watering pump discharge is not affecting buildings, properties • Ensure proper use of contractor's plant and equipment by experienced and qualified operators 	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor
14	Disruption of water service during connections	<ul style="list-style-type: none"> • Notification to users • Minimize duration that the contractor is allowed to carry out tie-in works / work during night if necessary • Backup plans • Detailed method statements • Pre-connection works and activities, checklists 	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract • DAWASCO's operating budget 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor • DAWASCO
15	Inadequate / improper disposal of pressure test water	<ul style="list-style-type: none"> • Transfer section to section if feasible • Suitable discharge point / stream, river avoiding scour • Carry the water by tanker to a suitable disposal point 	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor
16	Inadequate / improper disposal of chlorinated water	<ul style="list-style-type: none"> • Treat with neutralizing chemicals • Carry the chlorinated water by tanker to a suitable disposal point 	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor

SN	Impact	Proposed Mitigation	Source of Mitigation Funds	Responsible Party
17	Inadequate / improper disposal of excess / waste construction materials	<ul style="list-style-type: none"> Disposal in official dump sites Handling and disposal of wastes in accordance with Waste Management Plan Collection on site in designated bins / waste storage containers Re-use / re-cycle materials 	<ul style="list-style-type: none"> Included in Works contract Construction Supervisor's contract 	<ul style="list-style-type: none"> Contractor Construction Supervisor
18	Inadequate / improper disposal of sanitary wastes	<ul style="list-style-type: none"> Provide portable latrines at all work sites Maintain latrines and empty Prepare and implement Environmental Management Plan including sanitary waste disposal measures 	<ul style="list-style-type: none"> Included in Works contract Construction Supervisor's contract 	<ul style="list-style-type: none"> Contractor Construction Supervisor
19	Increased risk of HIV / STD among local communities	<ul style="list-style-type: none"> Design and implement an HIV / AIDS awareness training program to be organized by NGOs Awareness generation program among the neighbouring communities by the NGO, explaining the potential risks and protective measures every three month Participation of workers and communities in an HIV / AIDS awareness training program. Contractor to allow and encourage participation Provide condoms Sensitize workers on STD issues Zero tolerance of inappropriate behavior Medical check-ups 	<ul style="list-style-type: none"> Included in Works contract Construction Supervisor's contract 	<ul style="list-style-type: none"> Contractor Construction Supervisor Specialist NGO
20	Improper behavior / conduct on site and in communities	<ul style="list-style-type: none"> Strict disciplinary action - zero tolerance Drinking / drugs on site not tolerated Sensitize workers about behaviour as a visitor in the community 	<ul style="list-style-type: none"> Included in Works contract Construction Supervisor's contract 	<ul style="list-style-type: none"> Contractor Construction Supervisor
21	Temporary disturbance of crops / structure (walls, fences etc) during construction	<ul style="list-style-type: none"> Compensation. The RAP will be used as a basis for compensation Reinstatement to equal or better Supervision of reinstatement works Open dialogue with owner Prior documentation of affected crop / structure etc 	<ul style="list-style-type: none"> Included in Works contract Construction Supervisor's contract 	<ul style="list-style-type: none"> Contractor Construction Supervisor
22	Disturbance of existing rivers	<ul style="list-style-type: none"> Avoid accidental entry of materials into existing streams and water courses 	<ul style="list-style-type: none"> Included in Works 	<ul style="list-style-type: none"> Contractor

SN	Impact	Proposed Mitigation	Source of Mitigation Funds	Responsible Party
	and water courses during construction	<ul style="list-style-type: none"> • Method statement prior to commencing works • Appropriate diversion of flow around works • Schedule works for dry periods of low flow • Minimize extent of disruption of banks and river beds • Incorporate appropriate river bed / river bank protection works to prevent erosion • Replant grasses and vegetation to stabilize banks 	<ul style="list-style-type: none"> • contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Construction Supervisor
23	Disturbance of existing utilities and services	<ul style="list-style-type: none"> • Consult utilities / authorities prior to construction to confirm location of existing infrastructure and services • Provide adequate support / protection in accordance with the authority's instruction • Ensure supervision by utility / service providers • Provide adequate advance notice to users in case of utility / service shut-down • Ensure all workers are aware of presence and location of services / utilities 	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract • Operating budgets of individual authorities 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor • Utility Authorities (eg. DAWASA, TANESCO, TTCL, etc)
OPERATIONAL PHASE				
24	Pipeline bursts	<ul style="list-style-type: none"> • Implement regular monitoring and maintenance program • Adequate design • Good construction and testing • Special design / construction at key locations, eg road crossings etc • Adequate stock of repair kits available for immediate use • Emergency response action plan for major bursts • Easement, allowing immediate access to pipeline • Public encouraged to report leaks / bursts 	<ul style="list-style-type: none"> • Included in DAWASCO Operating budget 	<ul style="list-style-type: none"> • DAWASCO
25	Flooding risk during intermittent flushing of pipelines	<ul style="list-style-type: none"> • Discharge directed to existing watercourse or stream • Advance notification to public (if necessary) • Limit duration of washout activity 	<ul style="list-style-type: none"> • Included in DAWASCO Operating budget 	<ul style="list-style-type: none"> • DAWASCO
26	Theft / Vandalism of infrastructure	<ul style="list-style-type: none"> • Provide and maintain covers and locks • Regular inspection of assets 	<ul style="list-style-type: none"> • Included in DAWASCO Operating budget 	<ul style="list-style-type: none"> • DAWASCO

SN	Impact	Proposed Mitigation	Source of Mitigation Funds	Responsible Party
27	Scour of soils from use of washouts	<ul style="list-style-type: none">• Adequate design of washout facility• Monitor and arrange for remediation as necessary	<ul style="list-style-type: none">• Included in DAWASCO Operating budget	<ul style="list-style-type: none">• DAWASCO

8.4 Performance Reporting

Performance reporting is an integral part of the ESMP implementation. It documents how the project is performing against objectives and targets set in the ESMP. A schedule and procedures for reporting should be developed at the outset in order to:

- Identify any negative impacts from construction activities;
- Assess the effectiveness of control measures and take corrective action where necessary; and
- Demonstrate compliance with regulatory conditions and objectives and targets set in the ESMP.

Regular reporting of dust, noise, vibration and water quality will be required by the Construction Contractor and the regulatory authority. The frequency of this reporting will largely be dictated by the requirements of the objectives and targets set in the ESMP.

Regular meetings will be held between the Supervising Engineer and the Contractor's Environmental Officer. The purposes of the meetings shall be to:

- Establish the suitability of the Contractor's methods, plant and equipment, in an effort to lower the risk involved to the environment and persons;
- Discuss possible non-conformance with the ESMP or environmental legislation;
- Assess the general state of the environment on site and discuss any environmental problems which may have materialized; and
- Accommodate the local community concerns regarding social and environmental issues on site.

Monthly reports and non-conformance reports should be compiled by the Contractor and presented to DAWASA and the Supervising Engineer.

The monthly report shall include:

- Construction progress;
- A description of exceptional conditions on site whether they be meteorological, personnel related, machinery related, or otherwise stipulated;
- A description of any environmental accident or developments which could potentially develop into a non-conformance event by the Contractor; and
- Minutes from the meetings.

9 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

9.1 General

The objectives of the environmental and social monitoring plan are:

- To monitor the effective implementation of the proposed mitigation measures, during the construction and operational phases of the project;
- To confirm compliance with environmental, public health, and safety legislation / regulations;
- To ensure a commitment to best practice management to enable continuous improvement in environmental performance;
- To provide environmental information to community / stakeholders; and
- To provide early warning signals concerning potential environmental and social impacts, such that appropriate actions may be taken immediately, so as to prevent or minimize environmental / social consequences.

In order to achieve this, a practical system of verifiable indicators must be established that will assist in determining the effectiveness of the environmental and social management systems being implemented by the various responsible authorities.

Monitoring tools and methods may include a combination of visual observation, measurements, and documentation, among others. The outcomes of the monitoring will be recorded and assessed by DAWASA and their contractual representatives during construction, and DAWASACO during operations, to confirm, or otherwise, compliance with the ESMP. Where non-compliance is observed, the necessary corrective actions will be implemented at the earliest opportunity such that the errant environmental or social impact is addressed and returned to acceptable levels. Corrective actions may include changes to work methods, type / condition of plant and equipment, and personnel, and may also include changes to the frequency and type of monitoring.

9.2 Indicators and Monitoring Tools

The activities and potential impacts have been described earlier in Sections 2.3 and 7.4 respectively. For the purpose of monitoring, these have been separated into various groups. These are:

Construction Phase

- Project Management;
- Quality of Construction Plant and Site Management;
- Environmental Issues;
- Social Issues; and
- Health and Safety.

Operations Phase

- Operation and Maintenance.

Within each of these groups, various indicators have been identified that will be used to monitor the project and ensure compliance with the ESMP. The indicators are presented in Table 9.3.

The means by which the indicators will be monitored include a variety of tools and methods. These are described in Table 9.1.

TABLE 9.1 MONITORING TOOLS

Monitoring Tool / Method	Comments
Resettlement monitoring tool	This will include achievement of time-bound physical and financial targets through collection, analysis, reporting and use of information about the progress of resettlement. The targets will include budgetary allocation of funds , delivery of entitlements, consultations and grievances.
Visual inspection / witness	Includes inspection of materials and work methods, temporary works (eg. scaffolding, trench support, dewatering, etc), site tidiness and cleanliness, drainage and flooding, extent of topsoil stripping, tree removal and stockpiling of materials, public access, working in public roads, training workshops, among others
Physical measurements	Includes flow measurements, pressure, water quality, dimensional and quantity checking, etc
Manufacturers test certificates	Original factory test certificates ensuring compliance with specified international standards
3 rd part testing	Testing of materials by 3 rd party agency at proponents discretion
Testing works on site	Includes concrete works, pressure testing of pipelines, integrity and dimensional checking of protective coatings and linings, verifying soil characteristics, compaction of bedding and backfill, etc. All test results (pass or fail) to be recorded on test specific forms, to be approved by the construction supervisor.
Professional certification	Skilled personnel to provide copies of qualifications, trade certificates, etc and shall demonstrate skills if requested
Method statements	Contractor to provide overall method statement, as well as task specific method statements as instructed
Work schedules	Updated work schedules showing main activities, planned progress and actual, critical path, allocation of resources (contractors plant and work groups), etc
ESMP, H&S Plan	Contractor shall prepare a detailed Environmental and Social Management Plan and a Health and Safety Plan. These will provide clear guidelines concerning procedures and documentation, and will be used to monitor compliance
Periodic meetings	Includes progress meetings, technical coordination meetings etc
Extraordinary meetings	On as-needed basis depending on circumstances
Periodic reports	Progress reports, environmental reports, H&S reports, test certificates, payment certificates, etc
Extraordinary reports	Includes accident and incident reports, police and hospital reports, and other 3 rd party reports
External audits	Organized by proponent, DAWASA
Approvals and permits from jurisdictional authorities / agencies	At various points along the pipeline route, the works will cross / interfere with various jurisdictional authorities and utilities, eg TANROADS, TANESCO, TTCL, DAWASA, Bagamoyo District, Kinondoni District, among others. The contractor will be required to fulfill all necessary approval and permit processes required by each, and be subject to inspection and testing by their representatives
General public inputs	The general public will provide complaints and requests during the course of the works. Each one shall be duly recorded and appropriate corrective measures drawn up and implemented, as approved by the Construction Supervisor

Monitoring Tool / Method	Comments
Miscellaneous documentation	Various documentations may be requested from time to time to ensure performance and/or compliance, such as delivery notes of materials, labour and plant returns, insurances, equipment performance test certificates, etc
Technical specifications and drawings	The contract documents, including the technical specifications and drawings, will provide clear guidelines concerning procedures and documentation, and will be used to monitor compliance

9.3 Responsible Parties

The Proponent (DAWASA) of the project will be ultimately responsible for fulfilling the requirements of EMA 2004 (Tanzania's Environmental Legislation), including implementation of an appropriate monitoring plan.

The National Environmental Management Council (NEMC) will have the overall responsibility of undertaking enforcement, compliance, review and monitoring of the Environmental Management and Monitoring Plan, and shall provide national level support to the ESMP implementation process.

While the appropriate monitoring authorities will be assigned to the project, the successful bidder (ie. the contractor) will be fully aware that the first line of monitoring will be the contractor himself. In acknowledging the emphasis placed on the environmental and social management aspects of the contract, the contractor will be expected to play an active role in ensuring the ESMP is implemented and monitored. Passive participation, wherein the contractor aims only at the bare minimum, and relies on the feedback and inputs of others, will not be accepted.

As noted in Section 8.2, the contractor will be required to provide at the project site an Environmental and Social Manager, as well as a Health and Safety Manager. Both experts will be suitably qualified with experience in similar projects, and shall be responsible for monitoring the implementation of the ESMP and Health and Safety plans. The experts shall be on-site for the duration of the project.

The construction supervisor (as the Proponent's representative) will also have a suitably qualified and experienced Environmental / Social, and Health and Safety Supervisors¹² who shall be responsible for monitoring the contractor's performance through the verification indicators described herein.

Environmental and Health and Safety Supervisors will report directly to the Resident Engineer (the Team Leader of the construction supervisor), advising him on issues of non-compliance and recommended corrective actions.

The Kinondoni Municipal Environmental Management Officer and the Bagamoyo District Environmental Management Officer will oversee management of environmental issues and the implementation of EIA aspects of the ESMP. In addition, they will be responsible for the promotion of environmental awareness in relation to the protection of the environment in the project area. The Ward and Village Development Committees will be responsible for the proper management of the ESMP at the Ward / village level.

Resettlement issues will be monitored by an Independent Monitoring Team established under the Resettlement Framework, preferably involving Kinondoni Municipal Council and Bagamoyo District Council.

The parties responsible for implementing the environmental and social monitoring program are described in Table 10.2.

TABLE 9.2 ENVIRONMENTAL AND SOCIAL MONITORING PLAN - RESPONSIBLE PARTIES

SN	Responsible Party	Comment
1	NEMC	Overall responsible for enforcement. Inputs will be funded from their operating budget
2	DAWASA	As the proponent, DAWASA is responsible for ensuring that the monitoring plan is carried out in accordance with the requirements of the monitoring plan. DAWASA's inputs will be funded through the current Implementing Entity contract between DAWASA and MCA-T
3	Contractor	The cost of implementing the monitoring plan, including skilled personnel, will be included in the contractor's unit rates

¹² The Supervisor will have a minimum of a Bachelors Degree with experience of not less than 5 years in carrying out similar assignments.

SN	Responsible Party	Comment
4	Construction Supervisor (Resident Engineer)	<p>The Construction Supervisor (representing the proponent, DAWASA) will ensure that the monitoring plan is carried out and corrective actions are taken as necessary.</p> <p>The staffing and other resources required by the Construction Supervisor for the purpose of monitoring will be included in the services contract, yet to be entered into, between the between MCA-T and the Construction Supervisor</p>
5	DAWASCO	<p>Will monitor the operation and maintenance of the pipeline.</p> <p>Monitoring will be funded through DAWASCO's operations budget</p>

DAWASA, the proponent, will be required to have the project audited at regular intervals in accordance with environmental requirements. Such an audit provides further valuable feedback as to the effectiveness of the ESMP and its monitoring.

TABLE 9.3 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

SN	Indicator Groups / Sub-headings	Monitoring Tools (*)	Frequency	Source of Monitoring Funds	Responsible Parties
<u>CONSTRUCTION PHASE</u>					
1	Project Management				
1.1	Compliance with environmental laws / policies, etc	<ul style="list-style-type: none"> Copies of permits / approvals / certifications etc from jurisdictional authorities 	On-going	<ul style="list-style-type: none"> Included in Works contract Construction Supervisor's contract 	<ul style="list-style-type: none"> Contractor Construction Supervisor
2	Quality of Contractor's Plant and Site Management				
2.1	Quality and appropriateness of contractors plant, equipment and tools, including availability of spares	<ul style="list-style-type: none"> Visual inspection of plant Copies of all documentation, insurances etc including calibration tests, emissions tests, loading tests, if applicable 	Weekly	<ul style="list-style-type: none"> Included in Works contract Construction Supervisor's contract 	<ul style="list-style-type: none"> Contractor Construction Supervisor
2.2	Cleanliness / tidiness of site	<ul style="list-style-type: none"> Visual inspection of site and facilities Method statement 	Weekly	<ul style="list-style-type: none"> Included in Works contract Construction Supervisor's contract 	<ul style="list-style-type: none"> Contractor Construction Supervisor
3	Environmental Issues				
3.1	Loss of vegetation	<ul style="list-style-type: none"> Visual inspection and monitoring of vegetation Identifying and recording trees for removal Environmental and Social Management Plan 	Weekly	<ul style="list-style-type: none"> Included in Works contract Construction Supervisor's contract 	<ul style="list-style-type: none"> Contractor Construction Supervisor
3.2	Water quality related to rivers, streams and other drainage systems	<ul style="list-style-type: none"> Visual inspection of water bodies Environmental and Social Management Plan Complaints by public about flooding caused by contractor's activities Water quality monitoring, including collection or pre- 	Weekly (particularly during rainy season)	<ul style="list-style-type: none"> Included in Works contract Construction Supervisor's contract 	<ul style="list-style-type: none"> Contractor Construction Supervisor

SN	Indicator Groups / Sub-headings	Monitoring Tools (*)	Frequency	Source of Monitoring Funds	Responsible Parties
		<p>construction baseline data. Samples will be taken in existing drainage systems, at locations immediately upstream and downstream of active work areas. The water samples shall be compared for total solids content to determine the impact cause by the construction activity.</p> <ul style="list-style-type: none"> • 			
33	Waste disposal	<ul style="list-style-type: none"> • Visual inspection of waste disposal procedures and facilities • Environmental and Social Management Plan • Incident report concerning accidental or deliberate spilling / dumping of fuels or other wastes 	Weekly	<ul style="list-style-type: none"> • • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor
3.4	Erosion of soils	<ul style="list-style-type: none"> • Visual inspection of excavations and stockpiles of materials • Environmental and Social Management Plan 	Weekly	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor
3.5	Noise and air pollution	<ul style="list-style-type: none"> • Visual inspection of contractor's plant and equipment • Environmental and Social Management Plan • Complaints by general public about noise and/or air pollution caused by contractor's activities • Noise and air pollution monitoring, including collection or pre-construction baseline data. Readings and/or samples to be taken in accordance with the requirements of the specifications, or at location of complaint. 	Weekly	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor
4	Social Issues				
4.1	Disruption of services	<ul style="list-style-type: none"> • Complaints by general public as registered in complaints register • Damage register to record breakages and other disruption to services, and corrective actions taken 	Weekly	<ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor

SN	Indicator Groups / Sub-headings	Monitoring Tools (*)	Frequency	Source of Monitoring Funds	Responsible Parties
4.2	Access related issues	<ul style="list-style-type: none"> Environmental and Social Management Plan Visual inspection of existing services and infrastructure Complaints by general public as registered in complaints register Environmental and Social Management Plan Visual inspection of temporary measures to maintain access 	Weekly	<ul style="list-style-type: none"> Included in Works contract Construction Supervisor's contract 	<ul style="list-style-type: none"> Contractor Construction Supervisor
4.3	Loss of income / crops as a result of construction activities	<ul style="list-style-type: none"> Complaints by general public as registered in complaints register Environmental and Social Management Plan Damage register to record damaged items 	Weekly	<ul style="list-style-type: none"> Included in Works contract Construction Supervisor's contract 	<ul style="list-style-type: none"> Contractor Construction Supervisor
5	Health and Safety				
5.1	Worker training	<ul style="list-style-type: none"> Visual inspection / witness training and monitor content Health and Safety Plan 	Monthly	<ul style="list-style-type: none"> Included in Works contract Construction Supervisor's contract 	<ul style="list-style-type: none"> Contractor Construction Supervisor
5.2	Availability and use of safety equipment	<ul style="list-style-type: none"> Inspect safety equipment condition and usage Witness wearing of safety equipment Health and Safety Plan Contractor's disciplinary action records 	Daily	<ul style="list-style-type: none"> Included in Works contract Construction Supervisor's contract 	<ul style="list-style-type: none"> Contractor Construction Supervisor
5.3	Safety of construction workers	<ul style="list-style-type: none"> Accident report, including recommended changes to prevent further occurrences Hospital and Police reports Health and Safety Plan Inspect / witness work methods and use of equipment / tools 	Daily	<ul style="list-style-type: none"> Included in Works contract Construction Supervisor's contract 	<ul style="list-style-type: none"> Contractor Construction Supervisor
5.4	Safety of surrounding communities and general public	<ul style="list-style-type: none"> Accident report, including recommended changes to prevent further occurrences 	Weekly	<ul style="list-style-type: none"> Included in Works contract Construction 	<ul style="list-style-type: none"> Contractor Construction Supervisor

SN	Indicator Groups / Sub-headings	Monitoring Tools (*)	Frequency	Source of Monitoring Funds	Responsible Parties
5.5	Occurrences of HIV / AIDS	<ul style="list-style-type: none"> • Hospital and Police reports • Health and Safety Plan • Inspect safety barriers, signs, lighting, diversions, flag-men • Traffic management plan • Witness implementation of HIV / AIDS awareness program • Confirm availability of condoms • Hospital / clinic admission cases • 	Monthly	<p>Supervisor's contract</p> <ul style="list-style-type: none"> • Included in Works contract • Construction Supervisor's contract 	<ul style="list-style-type: none"> • Contractor • Construction Supervisor
6	<u>OPERATIONAL PHASE</u> Operation and Maintenance				
6.1	Well maintained, operational pipeline	<ul style="list-style-type: none"> • Maintenance records • Operations records • Flow and pressure monitoring • Pipe burst / emergency repair register • Water quality 	Monthly	DAWASCO operating budget	DAWASCO

9.4 Environmental and Social Monitoring Plan

The Environmental and Social Monitoring Plan is presented in Table 10.3. The project will maintain a weekly monitoring checklist to register and document all construction activities. Monthly compliance reports and non-conformance reports should be compiled by the Contractor and presented to DAWASA and the Supervising Engineer. The monthly report will include the effectiveness of any mitigation measures implemented and an indication of how well the intended outcomes are met in compliance with environmental regulations.

9.5 Cost Estimate for Implementation of the ESMP and Monitoring Plan

The estimated costs associated with implementing the proposed ESMP are shown in Table 9.4.

TABLE 9.4: COST ESTIMATE FOR IMPLEMENTATION OF ESMP

S/N	Item Description	Unit Rate (USD)	No. Yrs	Cost (USD)
	CONSTRUCTION (2 years construction + 1 year defects period)			
1.	Supervision and reporting on compliance with the ESMP	80,000 / yr	3	240,000
2	Implementation of a Monitoring Plan, including sampling and testing	30,000 / yr	3	90,000
3	Temporary and auxiliary works (by Contractor) ¹³	Lump Sum	-	100,000
4	Landscaping, erosion control and ecological restoration works	Lump Sum	-	50,000
5	Environmental awareness programs and public campaigns within the project area. on safety, HIV / AIDS, STDs, etc	Lump Sum	-	20,000
	Total Construction			500,000
	OPERATIONS (Duration of pipeline lifetime)			
	Implementation of a Monitoring Plan including testing	20,000 / yr	-	-

9.5.1 Cost Estimates for the Implementation of the Preliminary Resettlement Action Plan (PRAP)

The preliminary budget estimates for this Preliminary RAP includes costing affected properties and losses. The preliminary cost estimates for compensation of affected properties is detailed in Table 9.5.

Table 9.5: Preliminary Cost Estimates

	Compensation Item	Unit	Unit Rate (Tsh)	Compensation Amount (Tsh)
A	Compensation for loss of land (Sq M)			
	Land acquisition in Bagamoyo District	32,925	5,000	164,622,750
	Land acquisition in Kinondoni Municipal Council District	31,445	7,500	235,833,750
	SUB TOTAL	64,370		400,456,250
B	Compensation for loss trees (various)	225	Various	39,060,220
C	Compensation for structures (Sq M)			
	Concrete structures	5,274	550,000	2,900,700,000
	CIS/Brick	6,662	250,000	1,665,500,000
	Thatched/Mud and Pole	1281	150,000	192,150,000

¹³ This may include the purchase and installation of pipeline monitoring devices, temporary sediment and erosion control best practices prior to any earth disturbing activity, esp. at waterway/river crossing sites to ensure long-term environmental compliance.

	Wood/Temporary	372	75,000	27,900,000
	SUB TOTAL			4,786,250,000
D	Compensation for Loss of Income	55,598,000	6 months	333,588,000
	TOTAL (A+B+C+D)			5,559,354,470
	** Global Field Implementation and Administration (10%)			555935447
	Contingency (10%)			555935447
	GRAND TOTAL			6,671,225,364

(Source: SMEC, 2011)

Note: Shifting allowance and disturbance allowance have not been accounted for in this Preliminary Cost estimates. These will need to be finalized after the formal valuation of properties.

** A contingency of 10% of the compensation cost and global Field Implementation and Administration Cost has been assumed to cover implementation and administration costs, including; transport costs; running costs of the office/s; stationery; and communication.

The total estimated cost for compensation and implementation of RAP stands at Tsh 6671,225,364 (US\$ 4447483).

10 DECOMMISSIONING

The minimum lifespan of the proposed transmission main is 50 years. The following activities will be carried out to decommission the transmission main:

- The majority of the DN 1800 steel pipeline will be removed;
- Sections of the pipeline under the Bagamoyo road and portions that are close to or under existing buildings will be left in place. However, either the ends of the remaining pipeline will be plugged with concrete or the entire section of the pipe filled with concrete or sand;
- The DN 1800 steel pipe will be sold for possible re-use or for the fabrication of new steel;
- All trenches shall be backfilled with soil;
- Top soil shall be placed over the top of the existing trenches and re-vegetated
- Concrete structures will be removed and the concrete will be broken up and re-used for aggregates; and
- Online valves will be removed and sold for re-use.

All areas disturbed by the proposed decommissioning project shall be restored to pre-project conditions and/or to conditions acceptable to DAWASA and other relevant institutions.

11 SUMMARY AND CONCLUSIONS

The main conclusions drawn from the studies are:

- i. The project is justified on the grounds that Dar es Salaam's water supply has not changed since it was constructed in the mid 1970s, with the current demand exceeding supply by approximately 200 MLD;
- ii. The Government of the United Republic of Tanzania intends to expand the Lower Ruvu water supply system in order to improve the supply of potable water to Dar es Salaam and surrounding areas. Part of the necessary works includes the construction of a second large diameter supply pipeline between the Lower Ruvu Water Treatment Plant and the main storage tanks in Dar es Salaam;
- iii. The number of structure / property relocation issues has been eliminated in sections, or minimized, through an iterative process involving the investigation of alternative pipeline routes. The remaining issues are relatively minor and in proportion to the scale of the project;
- iv. Although much of the proposed pipeline will be constructed within the existing DAWASA easement, additional lands will be required to extend the easement on one side;
- v. The proposed alignment passes through relatively open bush, rural settlements as well as urban areas;
- vi. There are no ecologically sensitive areas along the proposed construction corridor;
- vii. The project area is devoid of free ranging herbivore species, but contains a variety of birdlife;
- viii. The two districts covered by the project area exhibit poor health and demographic indicators, suggesting that the increased water availability will have a bearing on the health of the population, including the more vulnerable groups;
- ix. The beneficial impacts of the proposed project far outweigh any negative impacts, all of which can be eliminated or mitigated by best practice engineering and construction methods;
- x. The majority of impacts are short term, construction related impacts, that can be effectively eliminated or mitigated by implementing relatively low cost, simple but effective measures;

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APPENDICES

Appendix 1	Household Questionnaire
Appendix 2	Terms of Reference for the EIA Study
Appendix 3	List of Persons Involved in Consultations
Appendix 4	Minutes of Group Meetings
Appendix 5	Photographic Record of Public Consultations
Appendix 6	Summary of Comments Received from Community Leaders
Appendix 7	Agreement in Principle - TANROADS and TWIGA Cement
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