UNITED REPUBLIC OF TANZANIA

PRIME MINISTER'S OFFICE

REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

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TANZANIA STRATEGIC CITIES PROJECT (TSCP)

ENVIRONMENTAL IMPACT STATEMENT OF THE PROPOSED REHABILITATION/IMPROVEMENT OF SURFACE WATER DRAINAGE SYSTEM IN KINONDONI MUNICIPALITY, DAR ES SALAAM REGION

TENDER N.º ME/022/2011/2012/C/12

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DECLARATION

We hereby certify that the particulars given to this report are correct and true to the best of our knowledge.

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Several other persons, such as Professor Raphael Mwalyosi, were involved in one way or another, in the preparation of and successful execution of this study. To all those, the proponent extends many thanks.

ABREVIATIONS

ARMCBP	Air Quality Monitoring Capacity Building Project
ACGIH	American Conference of Governmental Industrial Hygienists
ARV	Antiretroviral
BP	Bank Procedures
CDA	Capital Development Authority
CBA	Cost-benefit analysis
CBD	Central Business District
CBO	Community-Based Organisations
CEC	Conditional Environmental Clearance
CMAC	Council Multi-sectoral Aids Committee
DOE	Director of Environment
DAWASCO	Dar es Salaam Water and Sewerage Corporation
DAWASA	Water and Sewerage Authority
DCC	Dar es Salaam City Council
DLA	Dar es Salaam Local Authorities
DMDP	Dar es Salaam Metropolitan Development Project
DP	Decommissioning Plan
EC	Electric Conductivity
EWURA	Energy and Water Utilities Regulatory Authority
EHS	Environment, Heath, and Safety
EIS	Environmental Impact Statement
EMA	Environmental Management Act
EMP	Environmental Management Plan
EIA	Environmental Impact Assessment
HBC	Home Based Care
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
IAP	Interested and Affected Parties
IFC	International Finance Corporation
KICAMP	Kinondoni Coastal area Management
KMC	Kinondoni Municipal Council
LGA	Local Government Authorities
MP	Monitoring Plan
MMAC	Mtaa Multi-Sectoral Aids Committee
NMSF	National Multi-sectorial Strategic Framework

NEMC	National Environment Management Council
NEP	National Environmental Policy
NGO	Non-Governmental Organisations
OP	Operational Policy
PAP	Project affected Persons
PMO-RALG	Prime Minister's Office – Regional Administration and Local Government
PMTCT	Prevention of Mother-to-Child Transmission
PITC	Provider Initiating Testing and Counselling
RAP	Resettlement Action Plan
RWSSP	Rural Water Supply and Sanitation Programme
STD	Sexual Transmitted Diseases
SIS	Social Impact Studies
SADCC	Southern African Development Coordination Conference
STI	Sexual Transmitted Infection
TBS	Tanzania Bureau of Standards
TACAIDS	Tanzania Commission for AIDS
TANESCO	Tanzania National Electric Supply Company
TANROADS	Tanzania Road Agency
TAC	Technical Advisory Committee
TMC	Temeke Municipal Council
ToR	Terms of Reference
TSCP	Tanzania Strategic Cities Project
TDS	Total Dissolved Solids
TB	Tuberculosis
VCT	Voluntary Counselling and Testing
WMAC	Ward Multi-sectoral Aids Committee
WSDP	Water Sector Development Programme
WB	World Bank
WHO	World Health Organization

EXECUTIVE SUMMARY

Environmental Impact Statement for the Proposed Rehabilitation/Improvement of Surface Water Drainage in Kinondoni Municipality, Dar es Salaam Region

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1. A brief description of the project environment

The existing Sinza River (Mto Ng'ombe) is an open drainage channel with a general undersized cross section, bottom and banks with significant erosion problems and with significant number of houses settled in the river bed or in the flooding marginal areas. Some of the existing bridges (crossing roads) are significantly undersized and the final section of Sinza River (downstream Kawawa Road) is totally influenced by the Msimbazi River levels.

The study area has two major geological units: (i) the underlying substratum of (semi-) consolidated formations and outcropping rocks that consist of Neogene clay-bound sands to hard sandstone; and (ii) the superficial mainly loose sediments of the Quaternary System which are more extensive in the central and southern parts of Dar es Salaam region and consisting of less consolidated terrace sands and sandstones and recent alluvium.

Soils: site Sub-project is located in a low sensitivity landscape, within an urban area, in a low risk erosion area.

Hydrology: Hydrology is influenced by Sinza River which has a length of approximately 21 km and a basin area of 23.1 km^2. This river is a tributary of Msimbazi River which drains to the Indian Ocean and is perennial.

Vegetation types: consist of crops surrounded by wooded areas (at detention pond area), secondary growth vegetation with some woodland area around settlements and coconut palm and banana trees along Sinza River.

2. Project stakeholders and their involvement in the EIA process

Stakeholders were involved to get their views and concerns regarding the project. Five major levels of stakeholders were engaged including;

- National levels: Comprising of Ministries
- District Levels: Kinondoni Municipality
- Wards and Mtaa Levels (Local People and community leaders)
- Government Agencies and Departments
- International Organization

Some of the major issues of concern which were discussed included the following;

- The fate of those who properties were demolished during the first phase of DMDP
- The timetable for the implementation of the project
- What will be the fate of those whose properties have been damaged or destroyed by the floods before valuation exercise?
- What will be the fate of residents of Tandale kwa Mtogole whose properties have been affected by Kiboko Bar River
- Where is the Tsh. 5 billion from the first phase of DMDP

3. List of developer, consultant, local planning authorities and other people and organisations consulted

TABLE A

STAKEHOLDERS IDENTIFICATION

Name	Institution	Jurisdiction Area	Position
Eng. Gasper Msigwa	TANESCO	Kinondoni South	Manager
Ainea Kimaro	DAWASCO	Kinondoni	Manager
Mrs. Komba	Municipal Council	Kinondoni	Town Planner / Environment
Mathias Mlagambwa	DAWASA	Dar es Salaam Area	Engineer
Eng. Francis Mogishe	Kinondoni Municipal Council	Kinondoni	
Eng. Ignace A. J. Mchallo –	Department - NEMC	Throughout the Country	Director of Environmental Impact Assessment
Eng. Linus Shao –	Ministry of Lands and Human Settlement Development	Throughout the Country	Physical Planning Division Settlement Regularization Section
Local People	PAPs (People Affected by the Project)	Kinondoni Municipal	Local People
Local Leaders	Local Government	Kinondoni Municipal	Local Leaders

4. Description of Major Significant Impacts

The major environmental and social impacts identified include the following:

i) Improved quality of public health

The implementation of the project will lead to positive impacts through the reduction of flooding during the rainy season and reduction of soil erosion by the improvement of drainage infrastructures. The rehabilitation of the storm water drains may also contribute to the improvement of the visual appearance and aesthetics of the urban landscape of the city of Dar es Salaam, due to waste removal.

Implementation of the project will contribute to the improvement of the quality of life of the population, with sustainable and efficient system of infrastructures development. This improvement will in some way, contribute to the fulfilment of DMDP objectives, with regard to the health of the population.

ii) Improvement of landscape visual quality

There will be a positive impact caused by a permanent change in the visual setting of the landscape due to the presence of a better and improved infrastructure system in the Core Direct Area and Immediate Impact Area.

iii) Disruption of natural drainage network

Construction activities may disrupt the natural drainage network and cause flood events in the Core Direct Area and Immediate Impact Area, leading to negative impacts.

iv) Land take

The most significant negative environmental and social impact associated with storm water drainage project relating to the construction phase is land take for improvement/rehabilitation of surface water drains in Kinondoni Municipality and the detention ponds. The Project was designed to minimize the number of households to be affected as much as possible and this will be provided in the final EIA report.

The land take will lead to loss of agricultural land and access to natural resources caused by the construction of the detention pond and involuntary resettlement.

v) Risk of drowning for the population during heavy rains

There will be a negative impact associated with the risk of drowning for the population during heavy rains on the detention ponds, especially sensitive groups such as children and elderly.

5. Recommendation and Plan for Impact Mitigation/Enhancement Measures

Mitigation measures proposed include strategies or engineering construction best practices to prevent, avoid, minimize, restore or compensate impacts. The proposed mitigation measures for each of the above impact of major significance include;

a. Improved quality of public health

- Implement community sensitization programs on the risk for public health and safety
- Introduce education and awareness campaigns on solid waste management
- Promote introduction of improved pit latrines in unplanned settlements and introduce construction of sewerage systems
- Promote education and awareness campaigns on solid waste management.

b. Disruption of natural drainage network
    - Natural flow regimes must be maintained meaning, whenever necessary, alternative and temporary drainage must be implemented
    - The sedimentation of rivers and streams for construction materials should be minimized

c. Land take
    - All grievances must be reported to the authorities for conflict resolution
    - All PAPs should be paid compensation according to laws of the country
    - Establish dispute resolution committees
    - Educate the affected people about legal resolution mechanism.

d. Risk of drowning for the population during heavy rains
    - Attach of warning signs, barriers, and other precautions on all potential high risk areas
    - Implement community sensitization programs on safety measures to be taken.

6. Project Alternatives

Project alternatives considered selected preferred options to meet anticipated project objectives successfully. Alternatives considered took into account the design, technology, location and construction techniques compared in terms of environmental and social related impacts as follow;

- Alternative 1: Inclusion of two detention ponds on the Sinza River at Maji-Ubungo area and several selected interventions along the watercourse to widen and/or improve the river to meet the necessary hydraulic requirements;
- Alternative 2: No inclusion of the detention ponds on the Sinza River at Maji-Ubungo area but to implement several interventions along the watercourse to widen and/or improve the river to meet the necessary hydraulic requirements.
- Alternative 3: The "*No Project Alternative*", assuming that the Surface Water Drainage System Sub-project in Kinondoni Municipality will not be improved at all and that the Sinza River basin area will continue to experience flooding problems;
- Alternative 4: The "*Project implementation*" option corresponding to the inclusion of two detention ponds on Sinza River in the Maji-Ubungo area, with approximately 20,000 m^2 and 40,000 m^2 ponds (volumes of water of 39,000 m^3 and 65,000 m^3) as well as to implement a set of selected interventions along the water course to widen and/or improve the river to meet the necessary hydraulic requirements.

7. Environmental and Social Management

An Environmental Management Plan is presented as a detailed plan and schedule of measures designed to minimize and mitigate identified environmental and social impacts of the project. These measures/ actions outlined in the EMP will be conducted collaboratively and mainly coordinated by DMDP/PMO-RALG.

The DMDP/PMO-RALG will be responsible for reviewing civil works contracts in accordance with the EIA report; coordinating the implementation of the EMP among the contractors, local authorities (e.g. Regional Secretariat, District Councils and Village Councils); monitoring the implementation of the EMP and the civil works contracts in collaboration with local NEMC staff; and preparing semi-annual and annual environmental monitoring and progress reports. The EMP is presented in chapter eight of this report; and also as a standalone document separately.

8. Proposed Monitoring and Auditing

A monitoring regime was established and presented in the Environmental Management Plan (EMP) (presented as a standalone document). The Monitoring Plan prioritises the elements that must be in place prior to construction to allow a baseline to be established against which changes during construction and operation can be assessed.

Some of the necessary monitoring aspects can be included in the on-going activities of government agencies already active in the project area. Some will be the responsibility of the contractors and some should be carried out by other responsible parties for development and operation of the project or organisations appointed by them.

The monitoring programme also establishes effective feedback mechanisms so that the performance and effectiveness of the various elements of the EMP can be evaluated and, if necessary, corrective actions can be implemented.

It is also recommended that environmental audits should be done to determine the long-term effects of adopted mitigation measures. It is recommended that environmental audits be carried out on the project as part of the on-going maintenance programme. The audits will unveil the actual performance of mitigation measures and will allow effective measures to be included in future projects based on the legislation in force. As per operative EIA documents in Tanzania, environmental audits would be a responsibility of the developer and the National Environment Management Council (NEMC).

9. Cost/benefit analysis

The Cost Benefit Analysis was conducted by using Net Present Value (NPV), Benefit/ Cost Ration (B/C) and Internal Rate of Return (IRR). For NPV, a range of 1.0 to 14.3 million USD was computed for the different scenario, the results concluded that even for the worst case scenario there will be a positive social return benefit for all sub projects except for (IL10A) sub-project which yielded negative social return in every scenario tested.

10. Decommissioning

The Sub-project, which addresses the rehabilitation of storm water drainage in conjunction with the improvement of Mto Ng'ombe (Sinza River) and construction of two sequential detention ponds, is expected to be a permanent feature not to be decommissioned but rather to be regularly maintained as the need for surface water drainage is essential to prevent flooding events. The infrastructure will continue to have a passive influence on the environment and will be benign, so will not degrade or pollute the environment.

However, in the unlikely event of decommissioning, the facility (drainage system) will be left to deteriorate leading to occasional floodings and associated health risks related to water borne diseases such as diarrheal, dysentery, cholera, Malaria etc. In such a scenario, the structures will be dismantled, debris collected, site cleared and rehabilitated. Mechanisms of identifying, collecting and disposal shall be in place to ensure all wastes have been collected, removed and rightly disposed of. Areas disturbed by removal of structures shall be re-vegetated with grass and appropriate tree species.

CHAPTER 1.0: INTRODUCTION

1.1. PROJECT BACKGROUND AND RATIONALE

Dar es Salaam City represents the largest City and is the major industrial and commercial centre in Tanzania with an estimated population of about 4.36 million people according to the National Population Census of 2012. With an annual population growth rate of 5.6 percent which accounts for 10 percent of the total population of Tanzania Mainland, the area of the City is about 1,590.5 square kilometres and thus, registers a population density of 2,742 persons per square kilometre.

The Dar es Salaam Local Authorities set up comprises the Dar es Salaam City Council (DCC) and the three contiguous Municipalities of Kinondoni, to the North, Ilala at the Centre, and Temeke to the South. Together, the four Local Government Authorities are referred to as the Dar es Salaam Local Authorities (DLAs).

Dar es Salaam is experiencing significant problems with the existing Surface Water Drainage System due to a lack of infrastructure or, where drainage infrastructure is in place, it is being used as an informal receptacle for dumping waste and is severely impairing its performance. Currently, a significant part of the existing drainage network is old, undersized or partially blocked.

The government, under the oversight of the Prime Minister's Office, Regional Administration and Local Government (PMO-RALG) with the support from the International Development Agency (IDA) which is also referred to as the World Bank, is preparing an infrastructure improvement project for the city of Dar es Salaam named as the Dar es Salaam Metropolitan Development Project (DMDP). The overall objective of DMDP is to strengthen the institutional and urban management systems of the DLAs in order to improve service delivery. Under DMDP, there are seven complementary Projects which include the Surface Water Drainage System Project that aims to improve drainage management in the City by rehabilitating storm water infrastructure in order to provide a better welfare for City communities, especially those commonly affected by floods.

The overall objective of the Surface Water Drainage Project is to prepare the investments for a comprehensive Surface Water Drainage System for Dar es Salaam to be ready for implementation under the DMDP.

In the Stage Ia[1] of the Project it was prepared a Drainage Plan for Dar es Salaam city which identified and prioritized a set of 13 interventions with the purpose of mitigating and/or preventing

[1] Improvement of Surface Water Drainage System Sub-project in Kinondoni Municipality under the Dar es Salaam Metropolitan Development Project (DMDP) is being carried out in the following stages: Stage Ia: Drainage Plan and Pre-Feasibility Study; Stage Ib: Feasibility and Preliminary Engineering Designs; Stage II: Details engineering designs.

serious consequences arising from regular flooding. The proposed interventions involve both the primary drainage network (main rivers/streams) and the secondary network (artificial network).

This Plan is now followed by a Feasibility Study and Preliminary Engineering Design (Stage Ib) for the interventions considered as priority, under which is being developed the present Environmental Impact Assessment (EIA) Report.

The consultancy service for the Improvement of Surface Water Drainage Systems in Dar es Salaam is being carried out by the consortium M/s PROCESL - Engenharia Hidráulica e Ambiental, S.A. in association with M/s COWI Tanzania Limited.

The consultancy involves carrying out Environmental Impact Assessment and laying-down the Environmental Management Plan (EMP) as well as preparing an accompanying Resettlement Action Plan (RAP) for the proposed Sub-projects.

The Project will cover the Municipalities of Kinondoni, Ilala and Temeke where a number of selected Sub-projects will be undertaken.

However, this EIA is for the Kinondoni Municipality Sub-project which addresses the rehabilitation of storm water drainage in conjunction with the improvement of Mto Ng'ombe (Sinza River) and construction of two sequential detention ponds for the purpose of reducing the enlargement of river cross sections towards the estuary.

1.2. OBJECTIVES OF AN EIA

The objective of an EIA study is to carry out an assessment of a proposed project in order to determine whether or not the project and associated activities will have any adverse impacts on the environment, taking into account environmental, social, cultural, economic and legal considerations.

Specifically, the main objectives of an EIA are to:

(a) Establish before a decision is taken by any person, authority, corporate body or unincorporated body including the Government and local government authorities intending to undertake or authorise the undertaking of any activity impacts that may likely or to a significant extent affect the environment or have environmental effects on those activities;

(b) Promote the implementation of the Act and laws and decision making process through which the goal and objective in paragraph (a) may be realised;

(c) Encourage the development of procedure for information exchange, notification and consultation between organs and persons when a proposed activity is likely to have

significant environmental effects on trans boundary or an environmental bordering regions, districts, municipalities, towns and villages;

(d) To ensure the environmental considerations are explicitly addressed and incorporated into the development decision making process;

(e) To anticipate and avoid, minimize or offset the adverse significant biophysical, social and other relevant effects of development proposal;

(f) To protect the productivity and capacity of natural systems and the ecological processes which maintain their functions; and

(g) To promote development that is sustainable and optimises resources use and management opportunities.

1.3. SCOPE OF THE EIA

The Environmental Management Act (2004) stipulates the need to conduct Environmental Impact Assessment (EIA) for development projects in Tanzania. The Environmental Impact Assessment (EIA) and Audit Regulations (2005) regulate EIA procedures in Tanzania and outline the required EIA processes including the obligation for the project proponent to register the project with the National Environment Management Council (NEMC).

The scope of this EIA study covers:

- Describe the baseline environment of the relevant project area;
- Identify major environmental and social impacts which could impede project implementation and propose corresponding mitigation measures for the project;
- Identify major environmental and social impacts to minimize pollution, environmental disturbance and nuisance during construction and operation phases of the project;
- Identify and analyse alternatives to the proposed project;
- Develop an Environmental Management Plan (EMP) with mechanisms for monitoring and evaluating compliance and environmental performance.

1.4. PROJECT BOUNDARIES

1.4.1 Spatial Boundary

A river basin is an area of land that drains rain water into one location such as a river, stream, lake or wetland. These water bodies supply drinking water, water for agriculture and manufacturing, offer opportunities for recreation and provide habitat to numerous plants and animals.

The definition of the spatial boundary for the Sub-projects has taken into account the type of project and the surrounding characteristics, which is why it was considered for the majority of the

environmental and social components a study area corresponding to an overlap of the river basins bounded by the limits of the municipality. This area corresponds to about 6,317 ha.

The definition of this area also took into account the fact that the methodology used in hydraulic modelling for the Dar es Salaam Storm Water Drainage System has been prepared considering the entire river basins by its biophysics and socio-economic importance.

However, when deemed relevant to the objectives of this EIA it proceeded to the enlargement of the spatial boundary for some of the environmental and social components in the analysis according to the criteria defined by experts of the several components of the EIA. It is the case of protected areas and socio-economy (in terms of geographical units of the country, region, district, ward and sub ward).

1.4.2 Temporal boundary

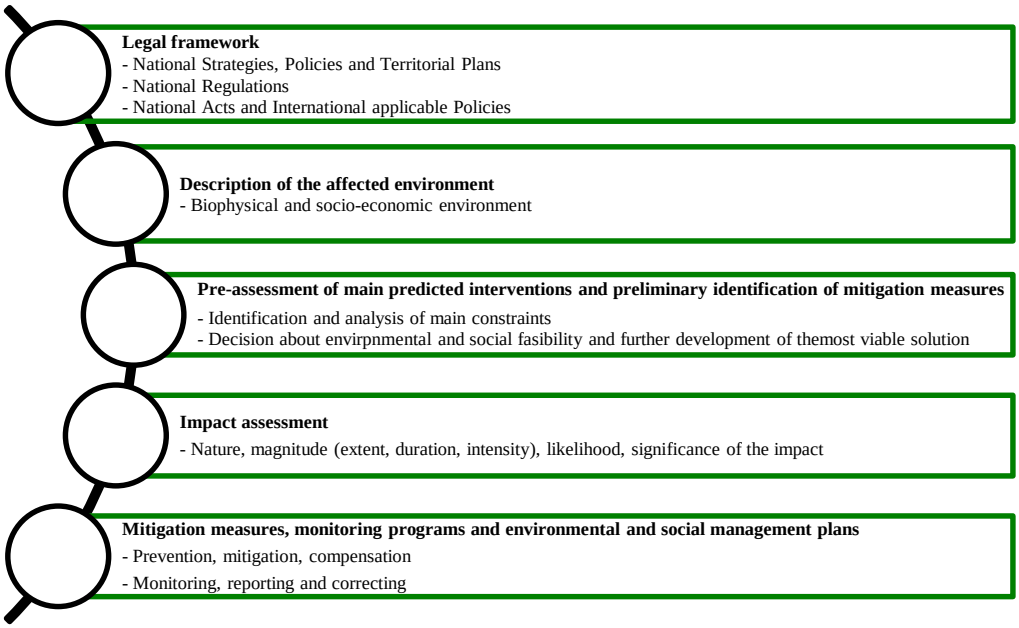
The temporal boundaries of the proposed interventions are referred to the project lifespan and the reversibility of the impacts and include the mobilization, construction and operation phases.

1.4.3 Institutional boundary

For what concerns the institutional boundaries of the Sub-projects, those include political administrative and institutional boundaries, acts and regulations, and ministerial or departmental mandates mentioned in Chapter 3.0.

1.5. EIA METHODOLOGY

The EIA was prepared by integrating stakeholder concerns and opinion, design considerations and legislative requirements. More specifically, the EIA process is set out in **FIGURE 1** below.



(PROCESL/COWI, 2014)

FIGURE 1
PROCESS OF ENVIRONMENTAL IMPACT ASSESSMENT

The study employed both qualitative and quantitative methodologies as follows:

1.5.1 Field investigations

As per the ToR requirements, baseline data information was generated through field investigation. Site visits were conducted in October 2013. Visits were made to the sub-project area to enable geographic positioning of the sub-project and consult the local population who resides along the drainage paths.

Also, during site visits the biophysical and socio-economic and cultural environments along the drainage paths were observed so as to understand the existing conditions including vegetation cover, settlement patterns, land use activities, existing social services, water sources, landscape, and soils.

The environmental and socio-economic baseline conditions considered several components (biophysical, ecological, financial, physical and infrastructural and socio-cultural) and arranged according to its scale of influence. Hence, for each factor a particular boundary was considered, reflecting the scale of analysis, its impacts and constraints.

The characterization of baseline conditions and the environmental and social components that are likely to be significantly affected by the project as well as the interaction between these factors were performed using the available digital and printed information, while planning field methodologies.

The level of detail depended on the relevance and sufficiency of the social information collected and disclosed by the detaining authorities.

1.5.2 Consideration of design alternatives

Project alternatives were considered and correspond to selected preferred options to meet anticipated project objectives successfully. Alternatives considered took into account the design, technology, location and construction techniques compared in terms of environmental and social related impacts.

1.5.3 Stakeholders consultations

Input from public consultation provides the authorities and the developer an opportunity to ensure that consideration is given to concerns and comments raised during the consultations. Consultations aimed at providing issues that are likely to be of interest to the communities and stakeholders in the EIA process. Stakeholders' consultations were done at Regional and District level, and included decision makers and project affected groups such as local residents in and around the proposed sub-project.

The consultation process started with the identification of major stakeholders of the project who had interest in the Project and who were directly or indirectly involved. Most stakeholders identified were those who used utility services such as water supply, sanitation and electricity. Other stakeholders identified included regulatory authorities, municipal authorities, local leaders and local people of respective wards and jurisdictions. Prior to site visit, the consultant team had been communicating with PMO-RALG for logistics related to project time frame and field work. PMO-RALG prepared a letter of introduction to be presented to each stakeholder prior conducting consultations. The details of methods and types of key stakeholders are addressed in chapter five of this report.

1.5.4 Literature review

Review of additional information was carried out to supplement existing data obtained from different sources. Documents and records were reviewed to obtain existing secondary data and information relevant to the study. A major source of such information included the socio-economic profile of Kinondoni Municipality and the National Bureau of Statistics reports. Other sources of secondary data were the various national policies and legislation, previous reports, World Bank Policies, the NEMC guidelines and international agreements.

Major guiding literature involved the Environmental Impact Assessment and Audit Regulations (2005), Environmental Code of Practice for Road Works (2009), 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), Cultural Property (OP 11.03) and district profile of Kinondoni area.

1.5.5 Impact identification and assessment

The approach used in the impact identification took also into account the Core Impact Area (CIA), the Immediate Impact Area (IIA) and Area of Influence (AI). The CIA is the identified drainage pathways which will be directly affected by project activities including sources of non-industrial construction material and sources of water. The immediate adjacent areas (or immediate impact areas) are those immediately outside the core impact area and are indirectly likely to be affected by the project activities. These include structure within the drainage corridor likely to be affected by resettlement. The AI is the area beyond the DIA which will be indirectly affected by the construction activities. These include sources of industrial construction materials, and centres of decision-making (e.g. Ward, District and City Council offices).

Impact analysis or evaluation followed a methodology based on the following sequential steps:

- Impact identification – listing all potential positive and negative impacts of a project, including cumulative and residual impacts;
- Impact prediction – determining the magnitude, intensity, extent or size of a particular impact or set of impacts;
- Impact evaluation – determining the significance or importance of a predicted impact i.e. why we should be concerned or worry about this significant impact.

Detailed descriptions of impacts assessment is presented in Chapter 6.

1.6. REPORT FORMAT

The structure of this EIA study involves the following chapters:

Chapter 1.0 – Introduction

This chapter contextualizes the project including its background and justification, objectives of the EIA and describes the general methodology applied in the development of the EIA Report.

Chapter 2.0 – Project Description

The major components of the project, covering aspects such as project location, project components and materials, water and sewerage system, type and sources of energy, waste management and project activities are presented in this chapter.

Chapter 3.0 – Relevant Policy, legal and Institutional Framework

This chapter presents a detailed description of the current policy, regulatory, institutional and administrative framework relevant to the Project.

Chapter 4.0 – Environmental and Socio-Economic Baseline Conditions

Chapter 4.0 describes the characteristics of the affected environment and describes the methodology adopted in each specific environmental component. The chapter also characterizes the project surroundings in a more or less detailed way depending on the information available and considers subsequent identification and evaluation of the environmental and social impacts likely to be generated during construction and operation of the project.

Chapter 5.0 – Stakeholders Identification and Methods of Participation

This chapter presents all the stakeholders identified and consulted, and discusses the main issues and concerns raised by stakeholders during the EIA elaboration.

Chapter 6.0 – Impact Identification and Assessment of Alternatives

This section proceeds to the description of the methodologies used in the identification and assessment of impacts resulting from the project. This chapter also presents an analysis of the considered project alternatives.

Chapter 7.0 – Mitigation and enhancement measures

Identifies mitigation measures to eliminate, minimize or compensate the impacts generated by the project as well as enhancement measures for the identified impacts.

Chapter 8.0 – Environmental Management Plan

This Plan is presented as a standalone document. The Environmental Management Plan (EMP) defines a detailed plan and schedule of measures necessary to minimize and mitigate any potential environmental impacts identified in the Environmental Impact Assessment (EIA) Report.

Chapter 9.0 – Environmental Monitoring Plan

Monitoring Plan designed to monitor implementation of the EMP and check performance during the operation phase of the project. It is a plan of monitoring the efficacy of predicted mitigation measures of the project.

Chapter 10.0 – Cost benefit Analysis

This chapter presents the project cost benefit analyses.

Chapter 11.0 – Decommissioning

Describes the activities foreseen and the impacts predicted to occur in this stage of the project.

Chapter 12.0 – Summary and Conclusion

This chapter presents a summary and the major findings of the EIA report, outlining recommendations for the project follow up based on the identified impacts and in the mitigation measures envisaged that intended to mitigate the negative impacts and maximize positive ones.

Chapter 13.0 – References

This chapter includes a list of the main bibliographical references consulted during the EIA study.

Chapter 14.0 – Appendices

In the appendix are included:

- Terms of reference;
- List of stakeholders consulted;
- Project layout;
- Adopted Solutions;
- Location and Definition of Proposed Interventions - Kinondoni Council.

CHAPTER 2.0: PROJECT DESCRIPTION

2.1 PROJECT LOCATION

Dar es Salaam is located in the eastern part of the Tanzanian mainland at 6º51'S latitude and 39º18'E longitude. The city is boarded by the Indian Ocean to the East.

Administratively, the present Sub-project will be developed in Kinondoni Municipality according to the **TABLE 1** and **FIGURE 2** below.

TABLE 1

PROJECT LOCATION

Municipality	Ward
Kinondoni	Kijitonyama
	Magomeni
	Makumbusho
	Manzese
	Hananasif
	Mwananyamala
	Ndugumbi
	Sinza
	Tandale

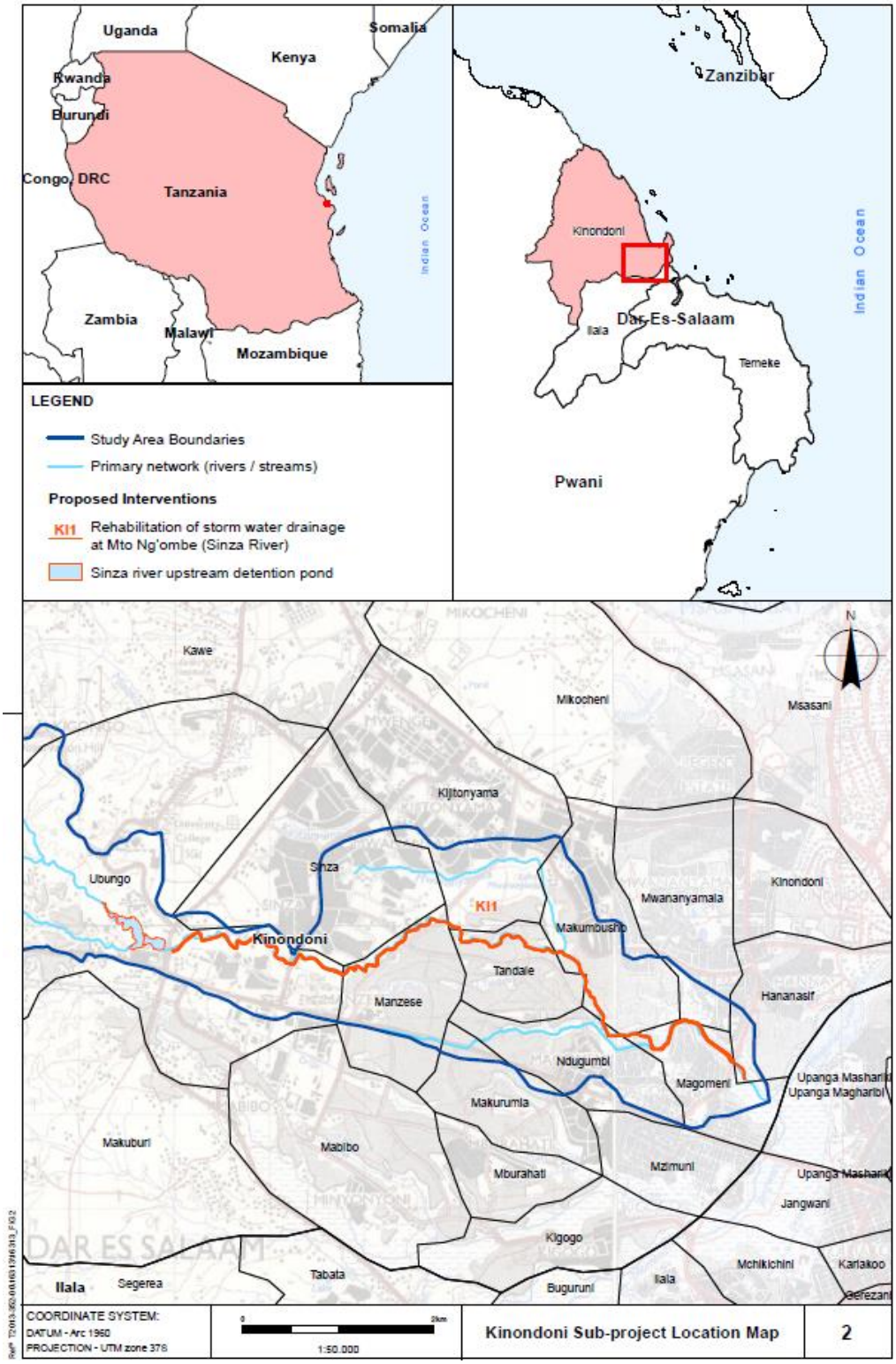
(PROCESL/COWI, 2014)

With about 40% of Dar es Salaam population, Kinondoni is the most populated district and Saranga being the most populated ward.

Within the municipal territory the mangrove trees are in threat due to salt mining activities that take place in the mangrove swamps and also due to the construction activities. Natural forests are in decline putting at risk several types of animals who find there their natural habitat.

With the main objective of preserving the marine and coastal area resources in the municipality, Kinondoni Coastal Area Management Project (KICAMP) is being implemented by the Kinondoni Municipal Council. Progress has been made, such as the prohibition of sands excavation at Kunduchi-Mtongani area. This initiative is one of the ways to prevent further beach erosion along the coastal areas.

It is noted that the natural course of Sinza River in Kinondoni Municipality (a primary network) is fed by engineered open earth channels through unplanned settlements where the engineered earth banks of the open channels are unstable due to erosion.



(PROCESL/COWI, 2014)

FIGURE 2

KINONDONI SUB-PROJECT LOCATION MAP

The few channel crossings are served at many locations with inadequate pedestrian accesses. In total there are 3 pedestrian bridges over the 7,0 km.

Solid waste is being informally dumped in the channels by locals into the open drains and crossing culverts and there are frequent blockages of solid waste inside channels, culverts and the primary channel.

In adjoining areas of artificial water ways (secondary network) there are small scales commercial activities near the paved road (Shekilando Road). Low size vegetation growing along the drains and the presence of waste causes blockage of free storm water flow.

The area chosen for the location of the detentions ponds is a natural depression prone to detain water. The detention ponds are located in the upstream section of Sam Nujomo Road Bridge.

The following photographs present a few examples of the places where the Storm Water Drainage tends to intervene in Kinondoni Municipality.

(Field work, PROCESL/COWI, 2014)

PHOTO 1, 2, 3 AND 4

VARIOUS LOCATIONS ALONG MTO NG'OMBE

As observed in the above pictures waste is scattered along waterlines and storm water drains, blocking the storm water flow, especially during the heavy rain seasons and making the whole area vulnerable to floods.

2.2 PROJECT COMPONENTS AND MATERIALS

2.2.1 Existing conditions

The existing drainage infrastructure is constituted by the Sinza River (Mto Ng'ombe) which is an open channel drain with a generally undersized cross section. The river bottom and banks have a significant erosion problem and there are a high number of houses in the river bed or in the flooding marginal areas. Some of the existing bridges (crossing roads) are also undersized. The final section of the Sinza River (downstream of Kawawa Road) is totally influenced by the Msimbazi River levels so it is not worth intervening significantly through this section of the river.

Taking into account the severity of the problems, the unavailability of a free corridor for enlarging or significantly extending the existing drainage infrastructure, and recognising the relevance of the Sinza River as a natural stream, it was applied a design return period of one in ten years plus an additional 15% allowance to accommodate the likely increased intensity of precipitation resulting from climate change. This means that for the next dozen or so years, before significant climate changes take effect, the intervention will have a designed period of return of approximately 1 in 25 years.

2.2.2 Project Components

The EIA study of the Surface Water Drainage System Sub-project in Kinondoni Municipality addresses the rehabilitation of Mto Ng'ombe (River Sinza) storm water drainage including the construction of two sequential detention ponds to avoid an extreme enlargement of the final river cross sections.

TABLE 2

CHARACTERISTICS OF THE PROJECT

Ki1 – Sinza River		
KM	**Length (m)/ Unit (u)**	**Works description**
Detention ponds		Construction of two complete detention ponds on existing natural depressions including excavation, embankment construction with impervious materials, inlet and outlet structures protected from erosion, gravel access road and protection barriers and warning signs, as well as all the associated ancillary works with volumes of 65,000 and 35,000 m3.
Between Sam Nujoma and Shekilango roads	1,100 m	Construction of marginal concrete walls to protect terrain/ houses against flooding with estimated dimension of 0.30m width and 0.5 to 2.0 m height above the existing terrain.
From 1+785 to 5+610	3,825 m	Construction of trapezoidal channels with 2.5 m depth and 9.0 m bottom width with bed and banks lined with gabions or concrete.
From 5+610 to 7+895	2,285 m	Construction of trapezoidal channels with 2.5 m depth and 13.0 m bottom width with bed and banks lined with gabions or concrete.
From 7+895 to 8+265	370 m	Construction of trapezoidal channels with 2.5 m depth and 14.25 m bottom width with bed and banks lined with gabions or concrete.
From 8+265to 8+480	215 m	Construction of trapezoidal channels with 2.7 m depth and 16.0 m bottom width with bed and banks lined with gabions or concrete.
1+775	-	Enlargement of bridge section under Shekilango Road by duplicating the existing cell.
3+805	-	Enlargement of bridge section under Ally Maya Road to a depth of 2.50m and a bottom width of 9.0 m and associated road tie-ins.
5+030	-	Enlargement of bridge section under Kajenge Road to a depth of 2.50m and a bottom width of 9.0 m and associated road tie-ins.
5+605	-	Enlargement of bridge section under a minor road to a depth of 2.50m and a bottom width of 13.0 m and associated road tie-ins.
8+480	1u	Final outlet
-	12 u	Construction/enlargement of concrete pedestrian crossings including railing protection.
Several (lower areas contiguous to main channel)	30 u	Lateral drainage along river sections where the top of the channel is higher than the surrounding terrain including collecting "depressions" constituted by cemented rock lining and sets of duckbill valves. These discharge points include trash racks, concrete boxes for installation of the valves and eventually complementary drains for collecting the waters to these low points.
-	80 u	Temporary barriers for isolating part of the river cross section for banks construction/lining (probably half river section)

(PROCESL/COWI, 2014)

Open channel watercourses such as rivers and streams normally have greater hydraulic capacity than piped systems thus, the consequences of flooding are usually greater due to the scale of the event.

The three principles behind the selection of design criteria are:

- Sustainability;
- Level of service;
- Cost-effectiveness.

As described in the table above the proposed interventions included in the Surface Water Drainage System Sub-project in Kinondoni Municipality are as follows:

- Construction of marginal concrete walls;
- Construction of trapezoidal channels;
- Construction/enlargement of concrete pedestrian crossings including railing protection;
- Enlargement of four bridges;
- Construction of lateral drainage along river sections where the top of the channel is higher than the surrounding terrain;
- Temporary barriers for isolating part of the river cross section for Bank construction/lining;
- Relocation of some houses lying in the river bed;
- Construction of two detention ponds located in the upstream section of Sam Nujoma Road Bridge. These types of storm water units are aimed at providing temporary storage and attenuation. The design of ponds and tanks uses the inflow/outflow hydrograph process.

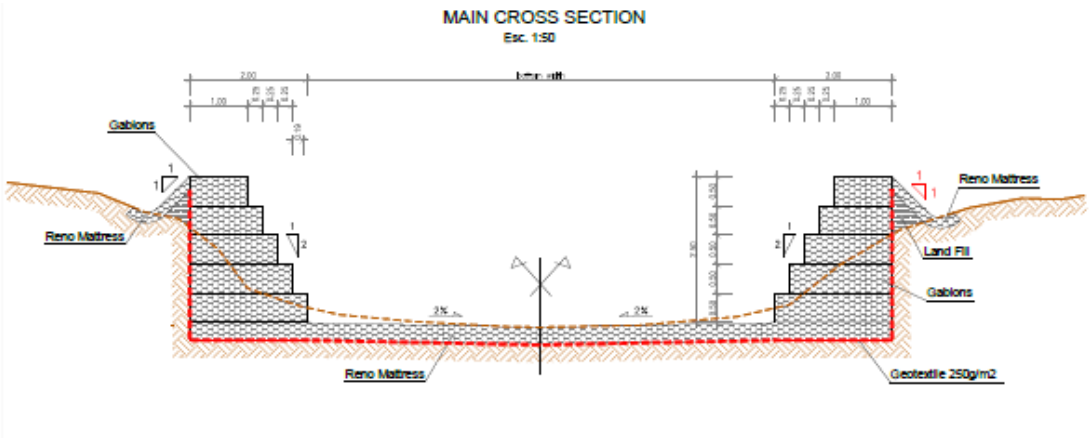


FIGURE 3

MAIN CROSS SECTION

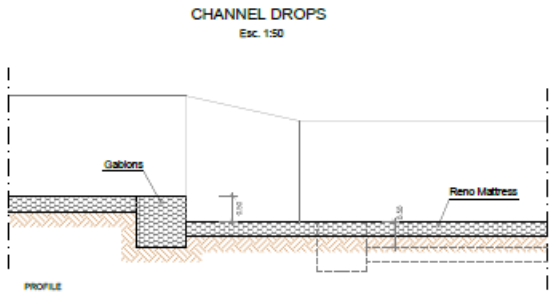


FIGURE 4

CHANNEL DROPS

Detention ponds

Construction of two detention ponds immediately upstream of the bridge under Sam Nujoma Road (in the Maji – Ubungo area), using undeveloped land next to the Water Development and Management Institute. This land constitutes a natural depression but additional earthmoving will be needed to create extra volume for water and to protect the embankments against erosion.

The location of these detention ponds is close to the future Waste Water Treatment Plant (oxidation ponds) and to ensure that this infrastructure will never be affected by the increased water depth in the ponds it is proposed that a structural wall will surround the oxidation ponds.

The detention ponds' walls will be constructed in gabions along its whole length, with a top elevation giving a clearance of 250 mm or 400 mm above the water surface elevation obtained for a 100 years+15% period of return, which corresponds if fulfilled approximately to a T= 500 years.

There will be two outlet structures in the ponds. In the bottom section of the wall are proposed 5 circular pipes (with diameters of 1,600 and 1,800 mm) to allow the ordinary flows to pass. The top spillway was designed to discharge the 100 years+15% flow and will not be needed for flows with periods of return lower or equal to 25 years. The spillway width will be 40 m for both the ponds.

There will be a gravel road to access the bottom outlets and the remaining areas. This road will allow some heavy equipment to access the main areas of the pond and will also provide access to the outlet structures for cleaning and maintenance.

It is also proposed that some areas of the detention pond will remain accessible for agricultural and leisure uses, so the necessary safety measures were considered as protective shrubs before the steepest areas, metallic fence around the spillway and warning signs. Eventually all the area influenced by the detention ponds can be fenced being not accessible for the people.

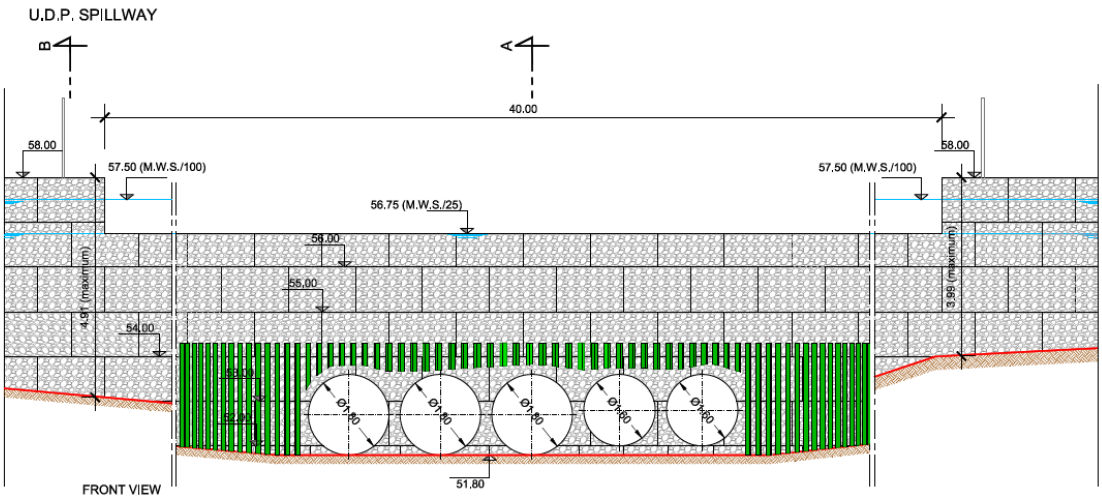


FIGURE 5

DETENTION POND SPILLWAY DETAIL

It should be noted that the design and nature of the detention ponds do not alter the conditions upstream, meaning that there will be no silt entrance into the system. Regarding downstream conditions, the solids remain in detention basins not allowing silt entrance to the downstream system. Additionally the project foreseen the maintenance of the detention ponds every two years, consisting in cleaning of drainage systems.

Sinza River section between Sam Nujoma and Shekilango Roads

On the stretch of the Sinza River between the detention ponds and Shekilango Road the only proposed intervention will consist of the construction of marginal concrete walls to protect terrain and houses against flooding. These walls were designed for a period of return of 25 years. For more extreme events these walls could be overtopped.

Sinza River section between Shekilango and Kawawa Roads

Between Shekilango and Kawawa Road bridges the Sinza River will be rectified and reshaped in order to accommodate the T=25 years flows (considering the effect of the detention ponds). The proposed cross section will have a trapezoidal shape with a 1H:2V side slope. The riverbed will be constituted by Reno Mattress or concrete with a slight slope (2%) down to the centre of the section. A gabion or concrete wall will coat the riverbanks. The concrete wall will be always used in the junctions with tributaries, bridge crossings and when geotechnical features don´t permit the use of gabions. The last section of the Sinza channel downstream Kawawa road will be in gabions because the area is a more natural one and no significant changes in the alignment exist. The remaining

sections along more urban areas and with a significant number of bends, crossings and junctions will be implemented using partly concrete lining.

The riverbank top elevation was designed considering the water super elevation on bends. Whenever the channel top elevation is higher than the marginal terrain elevation it was proposed special discharge areas with duckbill valves. Thus and as soon as the water level decreases in the channel after an intense rain event, the accumulated water in the lower surrounding areas will be discharged into the river. These valves impeach the backwater coming from the main channel to the referred low areas. During the construction phase there will be a need for temporary barriers to isolate part of the river cross section (probably half river section).

Road and pedestrian crossings

At every existing section passing under a road bridge where there was inadequate capacity to accommodate the 25 years period of return flow, was designed a new cross section/structure to meet the capacity needs.

Along Sinza River is also proposed the construction or enlargement of several pedestrian crossings, replacing the existing ones, which requires an enlargement of their span (estimated quantity of 12) and everywhere it would be found appropriate in construction phase.

There are previewed 3 different types of pedestrian crossings, adapted to the 3 different channel widths considering in this project (it is not previewed any crossing downstream Kawawa Road), to be constructed as standard box culverts.

In terms of road crossings, there are 7 bridges over Sinza River intervention area. Two of them - Sam Nujoma, 0+000, and Mlandizi Road, 3+300, the last one also studied in Local Roads project (with the same conclusion) are considered adequate to the designed flow and will not be intervened.

The Shekilango Road bridge, 1+775, actually consisting in a culvert with 2.5m width and 3.0m depth will need another culvert with the same dimension of the referred one. Considering that the river turns to left immediately downstream this bridge, it is important that the new culvert will be located in the left margin of the existing one.

The minor road bridge located on the junction of an important tributary (Mwananyamala), 5+605, needs to maintain the channel cross section with no any constraint and the same dimensions, because of the junction section shape. This bridge was studied in Local roads project and was found inadequate, but the dimensions proposed on the referred project were not the most appropriate.

Kawawa Road Bridge, 8+250, will not be intervened in order to not delay the on-going BRT works and not to affect the traffic in this important route, but the adoption of the existing cross section requires an intervention to accelerate the flow in the upstream sections, consisting of the adoption of a small drop (about 30 cm height) immediately upstream this bridge. As this infrastructure is influenced by the Msimbazi River backwater for high periods of return this fact was adequately considered in the hydraulic calculations. The alternative of reconstructing this bridge for enlarging it would only be hydraulically significantly effective if the closest stretch of Kawawa Road was reshaped in parallel.

The remaining road bridges, Ally Maya Road, 3+800, and Kajenge Road, 5+030, will consist in box culverts with the bottom width/ depth similar to dimensions of the proposed channel in their vicinity.

Safety and Maintenance aspects

Two detention ponds were proposed within the Sinza River intervention. These infrastructures were characterized above and their design includes a set of strict safety measures developed as described below, taking cognisance of advice detailed in "*Usual Safety Deficiences in Urban Stormwater Detention Ponds*", following the summary published in the Urban Drainage & Flood Control District Seminar of April 11, 2006, by Jonathan E. Jones et al. In fact it is proposed that some areas of the detention pond will remain accessible for agricultural and leisure uses.

Eventually all the area influenced by the detention ponds can be fenced being not accessible for the people.

TABLE 3

DETENTION PONDS SAFETY MEASURES

Usual Safety Deficiencies in Urban Storm water Detention Ponds	Recommended actions	Considered actions/details for guaranteeing the public security
Outlets are open and unprotected	Outlets must be protected by trash racks	One trash rack has been designed upstream of each detention pond outlet
They lack trash racks	All pipe inlet structures shall have a trash rack sized to prevent entry of children. A trash catching device must be installed on all outlets and be accessible for removing the collected debris	One trash rack has been designed upstream of each detention pond outlet. The inlets are the existing river or the upstream detention pond outlet
The existing trash racks have openings larger than the recommended	No greater than 12" (300 mm) and preferably 6" (150mm)	A width of 150 mm was specified

Usual Safety Deficiencies in Urban Storm water Detention Ponds	Recommended actions	Considered actions/details for guaranteeing the public security
The racks are too close to the outlets and that will impinge a person against them	To consider a rack surface area many times larger than the surface area of the outlet pipe(s) and deviate them from the outlets (not established distance)	The main trash racks are about 18 m from the outlets and the "free" trash area is about 3 times the total outlets area (approximately 34. 1 m^2 against 11.2 or 11.6 m^2)
Gaps between bars and concrete walls are too wide	The same for trash rack openings	A width of 150 mm was specified
Side slopes of the facility are excessively steep or vertical without safety rails	No less than 3H/1V side slopes	Except the main gabion wall and the upstream existing river bed section all the detention ponds areas are designed with slopes less or equal to 3H/1V
Pond inflow and outflow pipes are in close proximity to one another	No criteria defined	The distances between the inlet and outlet of the designed detention ponds are: UDP= 725 m and DDP= 295 m, which are quite distant
Pond depths increase very rapidly and the outlet/inlet pipes are quickly inundated and not visible	No criteria defined	It will be at least half an hour after an intense rainfall occurs before the water in the detention ponds completely inundates the outlet pipes. The total time to fill the detention area is at least 1.5 hours. The outlets will be not visible during about 3.5 hours
Prolonged pooling of shallow, stagnant water with potential for the mosquitoes presence and reproduction	The ponds must be designed for having less than 72 hours of stable, shallow, stagnant water	The detentions ponds will have stored water for about 24 h for the design period of return. For a 100+15% year period of return this time is approximately the same.
Dams and embankments are not designed to withstand overtopping forces during floods larger than they were designed to detain	-	The structural design of the main embankment wall has been modelled and verified considering the hypothesis of being overtopped for periods of return longer than 100years (+15%).
Adjacent land uses are incompatible with storage facilities	To confirm especially if there are not nursery schools in the adjacent vicinity not adequately protected	The detention ponds are inserted in Ministry of Water and WDMI land and both the current and the expected uses are for student rest/recreation and urban farming. The design solutions have been presented and discussed with the representatives of the referred authorities.
Signs warning the public of the presence of the detention pond and/or warning of rapidly rising floodwaters and the associated danger are not posted	Use signs that warn of rapidly rising floodwater placed for maximum visibility from adjacent streets, sidewalks and paths. Distribute flyers. Inform homeowner associations and property owners of these risks	Warning signs (in Swahili and English) are proposed to be located in all the probable access paths to the detention pond areas, advising of the proximity of areas subjected to periodic flooding and/or to prohibited access to areas concerning their hazardous conditions and the danger of drowning
Some detention pond facilities will invite use by children with activities like skateboarding on smooth concrete surfaces	To create rough surfaces	Rough surfaces are proposed where concrete is used.

Usual Safety Deficiencies in Urban Storm water Detention Ponds	Recommended actions	Considered actions/details for guaranteeing the public security
Barriers/fences to protect the access to the steep side slopes	Ponds designs will incorporate vegetative and barrier plantings or fences to discourage access to portions of a pond where steep slide slopes increase the potential for slipping into the pond	Vegetative barriers with endemic/local shrubs were considered at the edge of the steepest areas inside the detention ponds. Fences proposed around the spillway structures where they have open or accessible drops in excess of 900 mm.
The operational reliability of the detection ponds depend very much in the hydraulic capacity of the outlet structure. Should the bottom orifices be totally or partially obstructed by solid waste during an intense flood and the safety conditions of the pond will lowered with danger for the downstream reach.	To guarantee that all orifices as well as the area upstream the outlet structure are free of any kind of waste is very important.	Some protective passive measures were considered in this project.

2.2.3 Materials

Gabion baskets will be used for construction of river banks and bed particularly for those sections which needed to be widened. However, whenever required, a reinforced concrete channel detail will be used for geotechnical reasons. Moreover, gabions/concrete and reno mattresses will be adopted where there is significant risk of erosion of the banks and bottom.

The rehabilitation of the Storm Water System in Kinondoni Municipality shall entail River Sinza regularization, construction of two detention ponds and enlargement of bridges which will require the following construction materials and quantities:

- Concrete;
- Shotcrete;
- Reno mattress;
- Precast concrete slabs;
- Stone masonry;
- Iron;
- Soil earth materials, block and sand;
- Water:
- Oil.

TABLE 4

EARTHMOVING AND QUANTITIES

Excavations (m^3)	105.000
Fillings using excavated materials (m^3)	20.000
Fillings with materials from borrow sites (m^3)	25.000
Removal and restatement of road gravel pavements (m^3)	0
Surplus material to dispose in certified dump (m3)	120.000
Clearing vegetation and bushes (m^2)	70.000
Rock for gabions in detention ponds and channel linings (m^3)	124.000
Reinforced concrete (m^3)	1.400

(PROCESL/COWI, 2014)

Some of these materials might be used in the operation phase for activities of reparation, relining channels and small masonry and concrete repairs. All materials will be obtained locally.

It was conducted a construction material investigation aimed at identifying suitable and sufficient sources of construction material within economical haulage distance.

The investigation included identification of:

- Borrow sites-sources of fill material
- Sand deposits-source of concrete sand
- Quarry sites-source of concrete aggregates
- Water sources for Construction water

BORROW SITES

Two borrow area have been identified and investigated namely three borrow pits have been investigated, sampled for further laboratory testing; these include Bokotimiza and Bunju borrowpit.

TABLE 5

BORROW SITES

Borrowpit name	Overburden thickness (m)	Average thickness seam material(m)
Bokotimiza	0.25m	2.5
Bunju	1.5m	2.0

(PROCESL/COWI, 2014)

SAND DEPOSITS

One sand deposit has been identified namely Mpiji river sand and forwarded to the laboratory for further laboratory testing.

QUARRY SITES

Two quarry sites namely Ihembe and Safa at Lugoba area in Coast region, have been identified, sampled and forwarded to the laboratory for further laboratory testing.

EARTHMOVING

For the realization of the construction works, it is estimated that the volume of land being excavated approach of 105.000 m^3. Regarding filling the value of land rounds 45.000 m^3.

Given the above, it will be necessary to rely on other sources for obtaining material for filling, for instance in existing quarries in the region.

2.2.4 Equipment

The equipment to be used at the construction sites will include:

- Heavy construction plants like bulldozers, graders, wheel loader, vibrators etc.;
- Hauling trucks;
- Trans mixer trucks (ready mix);
- Concrete vibrators;
- Trucks for material haulage;
- Generators.

All equipment referred is locally obtained and will be provided by the contractor.

The equipment and machinery to be used at the operation phase will include:

- Shovels;
- Drainage pumps;
- Diesel compressor
- Dump trucks;
- Sewer rods and jet machines.

All equipment referred may be locally obtained and will be provided by the KMC /Contractor.

2.2.5 *Construction Camps*

Potential location sites will largely depend on the e.g. size of the land, space, accessibility to the site, haulage distances for transferring construction equipment etc. Locations and types of construction camps have not yet being developed in this design. However, the developer has commit to provide potential camp sites during construction phase.

2.2.6 *Human Resources*

Creation of temporary employment during construction is expected to increase income of the people around the project sites. The project will create temporary employment particularly for Engineers, Foremen, skilled and non-skilled labour.

Some labour forces will be recruited from local communities - especially for simple and manual operations that could easily be accomplished using local skills. However, the main contractor will be responsible for the recruitment of the work force since he will be aware of the work schedule, quality of the work that is needed, the budget for the workforce and safety issues.

It is estimated between 150 to 250 workers will be required. The range depends on the contractors working method/equipment etc. It is anticipated that every sub-project will be independently constructed, by independent contractor. If some of the drainage sub-projects are performed by same contractor, the total amount of workers will be reduced but this has not been taking in to consideration.

2.2.7 *Compensation and Resettlement Issues*

The draft valuation report of affected assets recorded a total of 366 affected households in Kinondoni Municipal and a total cost of TZS 4,103,644,863.42 (excluding management and contingency) (appendix 14.7). The affected assets include land, houses, external toilets, chambers/septic tanks, fences and foundations.

2.2.8 *Type and source of energy*

According to the interview conducted between consultant and TANESCO it was mentioned that TANESCO will provide services from its regional offices since the project extends towards the northern and southern jurisdiction respectively[2]. For construction and operation purposes, standby diesel power generators will also be used.

[2] Meeting Notes Conducted on 10.15.2013 with TANESCO Regional Manager – Kinondoni South

2.2.9 Water and Sewerage System

During construction and operation phase, water will be supplied by DAWASA. However, based on the nature of the project and the construction works to be performed, it is not possible to estimate the amount of water required for the works. Nevertheless, it is expected that no large amounts of water will be required.

Regarding the sewerage system during the construction phase this shall be ensured by DAWASA who is the responsible authority.

DAWASA was contacted, in particular to obtain the cadastre of existing infrastructure in the area where the projects are being developed. They have replied that they do not have any layout plans but that they will give some assistance during Project Execution.

2.2.10 Waste Management

During construction, various kinds of wastes will be generated including organic matters from vegetation clearance of the site, papers and households wastes from office and from the site, iron pieces and scraps from cutting and fixing of parts, waste oil from services and maintenance of vehicles and machinery, concrete, soil and rocks from rehabilitation works of the Storm Water System. During operation phase, waste will be generated from the production of organic materials and sediments from clearing existing drainage infrastructure facilities, waste concrete, debris, iron and steel wastes from the reparation of pipes and gabions (see **TABLE 6**). It will be the responsibility of the contractor to clean the site before construction. Large amount of waste will be collected by contractor's equipment / trucks or sub-contractor whom will be appointed by the contractor.

TABLE 6

PRODUCTS AND WASTE PRODUCED

Products	Waste produced
---	Mixture of debris (due to demolition)
---	Organic matters (from vegetation clearance)
Water, soil and earth materials	Mud slurry
Concrete, shotcrete, precast concrete slabs	Concrete waste
Iron	Iron waste
Steel	Steel waste
Blocks and stone masonry	Mixture of debris
Paper, plastic, glass	Households wastes (paper, plastic, glass, organic matter)

Products	Waste produced
Oil	Waste oil

(PROCESL/COWI, 2014)

The project is not expected to generate hazardous materials which are toxic to human beings and other living creatures, nevertheless there is high degree of contamination from many toxic sources that enter surface water drainage systems.

All wastes produced will be collected and disposed of in an appropriate manner. Thus, for households and office waste, there will be four bins: paper materials; organic material; glass wastes and plastic materials. The contractor is to oversee this process and collect these in a secure area at the contractor's camp site.

The contractor is to be responsible to collect waste during construction period and municipal council service provider during operation period. During construction contractor has option of sorting waste and have scrap metal, wood and plastic bottles sold to local petty traders who collect them.

Similarly, for construction works wastes, those which are easily segregated will be categorized according to their characteristics as far as practically possible. Metal wastes, toxic and chemical wastes, plastic wastes, liquid wastes and solid wastes will be separated and disposed-off in environmental friendly manner. The methods of disposal include the following:

- Specialized dealer: these are experts in disposing special wastes such as chemicals and waste oil.
- Pits: these are common for organic materials such as foodstuff which can decompose quite easily. It is a low-cost, low-tech disposal method that does not require wastes to be transported away from the construction site, and, therefore, is very attractive to many people as long as there is enough land.
- Landfills: landfills are used throughout the world for disposing of large volumes of municipal, industrial, and hazardous wastes. In this method wastes will be placed in an engineered impoundment in the ground and then waste will be covered with a layer of clean soil or some other inert cover material. Dar es Salaam City will be subcontracted to dispose the wastes, thus all waste are to be dumped at the current official dump which is at Pugu, and not to be taken to any transfer station. If the official dump changes during the course of the project implementation, the municipal will specify where the official dump is.

2.3 PROJECT ACTIVITIES

2.3.1 Mobilization

Prior to the commencement of civil works, there will be cleaning of the project area. This process may involve vegetation and crop removal in addition to the demolition of structures, infrastructures and waste removal.

Moreover, the works will include acquisition and / or mobilization of construction equipment and machinery, vehicles, bulldozers, excavators, concrete vibrators, generators and stockpiling of materials.

The mobilization of equipment and other preparatory logistic is estimated to last for at least four weeks.

2.3.2 Construction phase

The rehabilitation/improvement of storm water drainage at Mto Ng'ombe (Sinza River) will include the construction of two sequential detention ponds which will involve excavation, ditching and levelling activities.

The important stages of the construction phase, corresponding to the rehabilitation/improvement of the cannels and the construction of the detention ponds, can be summarized as follows:

- Establishment of construction camps and machinery;
- Engineering works for earthmoving, cutting and filling;
- Transport of materials;
- Possible temporary construction of access roads to workplaces;
- Cleaning and removal of materials in areas intervened;
- Construction of trapezoidal channels;
- Construction of marginal concrete walls;
- Enlargement of four bridges;
- Construction/enlargement of concrete pedestrian crossings including railing protection;
- Construction of two detention ponds located in the upstream section of Sam Nujomo Road Bridge;
- Construction of lateral drainage along river sections where the top of the channel is higher than the surrounding terrain;
- Temporary barriers for isolating part of the river cross section for Bank construction/lining
- Restoration of the landscape;
- Land expropriation and resettlement of houses and infrastructures.

The construction period will last approximately 20 to 24 months.

2.3.3 Operation phase

The main activities during operation phase will be the maintenance of the system by:

- Regular maintenance of the storm water drains by cleaning all components of the storm water drainage system;
- Reparation and relining channels and small masonry and concrete repairs;
- Cleaning of all components of the storm water drainage system, including open and underground channels;
- Development of an inspection program with regular inspection of the storm water drainage system;
- Intervention in case of system crashes;
- Monitor the capacity of the system, including structural integrity of the system;
- Public awareness on the sustainable use of the storm water drainage network;
- A general inspection of the detention ponds after each heavy storm events;
- The removal and properly disposal of the accumulated sediments in the detention ponds, after a heavy storm event or every two years;
- The removal of eventual nuisance vegetation in the detention ponds especially on embankment (when applicable);
- Cleaning out clogged outlet and drainage system in the detention ponds.

2.3.4 Decommissioning Phase

Decommissioning phase is not anticipated in the foreseeable future. However, if this were to occur, may entail change of use (functional changes) or demolition of structures triggered by change of land use for what concerns the detention ponds, involving laying off workers, disposal of spoil material and debris and where necessary, rehabilitation of the area.

CHAPTER 3.0: RELEVANT POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

3.1 POLICY FRAMEWORK

National Environmental Policy (NEP), 1997

The National Environmental Policy outlines the framework of fundamental changes that are needed to bring environmental considerations into the mainstream of decision making in Tanzania. It provides policy guidelines, plans, guidance on priorities, and recommendations for monitoring and review of policies, plans and programmes that directly relate to the environment.

The National Environmental Policy, particularly stress on the need to formulate environmental legislation and sectorial legislations as an essential component for an effective and comprehensive environmental management and improvement of life. Meaningful and effective environmental law must be clearly understood and treasured by the communities and individuals whom it is aimed.

The project will address these policy objectives by ensuring that environmental issues are mainstreamed into the project planning and implementation.

National Land Policy (NLP), 1995 (Revised in 1997)

The NLP is a comprehensive policy pronouncement regarding land tenure, management and administration. The overall objectives of this policy among other things are; to promote and ensure the existence of a secure land tenure system in Tanzania and; to sustainably foster optimal use of land.

This policy emphasizes on integrated planning and improved management of urban centres and the designation of urban and land uses, based on environmental impact considerations.

NLP recognises the importance of social services such as water supply, road networks, waste management and energy development that take place on land for human benefits, to be done in a right manner so as to protect land for other uses and avoid land degradation. In addition, the policy identifies the need for conservation and preservation of prehistoric/historic sites and buildings.

As this policy recognizes the importance of protect public service utilities for environmental protection, the design and construction of the Project will consider restoration of public service utilities and road infrastructure. The Project design, construction and operation will also ensure that solid waste does not accumulate and create blockage of drainage systems through periodic cleaning of open drains.

National Human Settlements Development Policy, 2000

Among other important objectives of this policy is to recognize environmental protection within human settlements and protection of natural ecosystems against pollution, degradation and destruction with two main objectives:

i. To promote development of human settlements which are sustainable;
ii. To facilitate the provisions of adequate and affordable shelter to all income groups in Tanzania.

Additionally, the policy recognizes the role of the National Environment Policy and other sectoral policies for attainment of urban development and need for coordination and cooperation with other sectors / stakeholders, including Community-Based Organisations (CBO), and Non-Governmental Organisations (NGO) in urban development planning.

From a very preliminary stage of project development, the importance of stakeholder's involvement and interested parties was recognized. The project itself has an ultimate objective of ensuring the safety and welfare of the people while considering the protection and sustainable development of human settlements.

Agricultural and Livestock Policy, 1997

Agricultural and Livestock Policy addresses the changes that affect the agricultural sector in Tanzania and specifically addresses restrictions to agricultural practices stemming from the National Land Policy and the need for agricultural practices to ensure protection of the environment. The objective of this policy is to improve food security and alleviate poverty, while promoting integrated and sustainable use and management of natural resources such as land, soil, water and vegetation.

Although this project is being mostly developed in urban areas, the area reserved for the implementation of the detention ponds contain various vegetation forms which need to be cleared for the construction of the facilities. Moreover, agricultural activities such as urban faming may be practiced in this area for domestic consumption.

National Forrest Policy, 1998

The overall goal of the National Forest Policy of 1998 is to enhance the contribution of the forest sector to sustainable development of Tanzania and conservation and management of natural resources for the benefit of present and future generations. In practice this means that forests have

to be managed in terms of socio-economic, ecological and cultural sustainability, in accordance to the principles of multi-functionality and equitable benefits and responsibility sharing.

The policy sets four priority areas for legislation and implementation, namely: forest land management; forest-based industries and products; ecosystem conservation and management; and institutional and human resources.

The EIA process will take into consideration the provisions of the National Forest Policy in particular ecosystem conservation and management where clearing of vegetation and widening of river banks will be given special attention especially during construction period.

National Water Policy (NAWAPO), 2002

The National Water Policy recognises water as an important requirement for all humans to maintain health, and to restore and maintain the functions of natural ecosystems. The main objective of this policy is to develop a comprehensive framework for sustainable development and management of water resources. The policy aims to ensure that beneficiaries fully participate in all stages of water resource development and recognizes the fundamental but intricate linkages between water and socio-economic development, including environmental requirements.

The Surface Water Drainage System Sub-project in Kinondoni Municipality will contribute to the protection of the water resources once it will allow the natural storm water to flow into the receiver water bodies and the minimization of surface and underground water resources pollution.

National Policy on HIV/AIDS, 2001

The overall goal of the National Policy on HIV/AIDS is to provide for a framework for leadership and coordination of the national multisectoral response to the HIV/AIDS epidemic. This includes formulation, by all sectors, of appropriate interventions which will be effective in preventing transmission of HIV/AIDS and other sexually transmitted infections, protecting and supporting vulnerable groups, mitigating the social and economic impact of HIV/AIDS. It also provides for the framework for strengthening the capacity of institutions, communities and individuals in all sectors to arrest the spread of the epidemic.

The project will likely hire local people from Dar es Salaam City who will interact with the surrounding community. It is the responsibility of the Project developers to participate in the fight against HIV/AIDS by raising workers awareness and their individual responsibility in the prevention of the epidemics.

Community Development Policy, 2003

The objective of the Community Development Policy is to enable Tanzanians as individuals or in their families and/or groups/associations to contribute more to the government objectives of self-reliance and therefore bring about development at all levels and finally the nation as a whole.

The relevance of this policy for the project relates to the fact that the project contributes towards community development for the eradication of poverty.

3.2 LEGAL FRAMEWORK

Constitution of Tanzania, 1997-1995

The current Constitution of the United Republic of Tanzania was ratified in 1977. It is the country's fourth Constitution since the independence from the United Kingdom (9 December 1961 for Tanganyika and 10 December 1963 for Zanzibar) and recognises the basic rights for its people to the protection of their life by the society in accordance with the law.

The National Constitution has to be taken into account in the project especially in matters concerning human rights as stipulated in the constitution. It is expected that the construction of the project leads into land acquisition and loss of properties, which shall consider the execution of compensation according to the national laws.

Environmental Management Act (EMA) No. 20, 2004

The National Environmental Management Act (EMA) No. 19 of 1983 started the process of regulating environmental management in Tanzania. Although draft EIA guidelines and procedures were produced in 1997 and amended in 2003, the country lacked a coherent code of supporting legislation to enable effective environmental management. Therefore a study was initiated with funding from the World Bank, known as the Institutional and Legal Framework for Environmental Management Project. This culminated in the promulgation of the Environmental Management Act (EMA) No. 20 in 2004.

EMA stipulates the need to conduct Environmental Impact Assessment (EIA) for development projects in Tanzania. EMA provides a policy framework for environment and natural resources management and:

- provides the legal and institutional framework for the sustainable management of the environment;

- stipulates impact and risk assessments, the prevention and control of pollution, waste management, environmental quality standards, public participation, compliance and enforcement;
- provides for the implementation of the National Environment Policy;
- repeals the National Environment Management Act of 1983;
- provides for the continuance of the National Environment Management Council, as well as the National Environment Trust Fund.

Sub-section 129 (1) of the Act states that every local government authority shall construct storm water drains within its area of jurisdiction and make sure they remain clean. The improvement of the Surface Water Drainage System in Kinondoni Municipality will be done in collaboration with Kinondoni Municipal Council (KMC).

Other important EMA Act provisions which are relevant to this project include the following;

Part ix - Management of Solid Waste

Among other relevant issues of concern, cap 141 (2) c states that *"the Local Government must ensure the appropriate sorting of waste is made right at the source and in accordance with standards or specifications prescribed by the local government authority concerned"*.

Cap 123 (1) - Management of Liquid Waste

This provision states that "The local government authorities may prescribe and issue guidelines on how liquid waste from domestic and commercial premises is to be treated and finally disposed of both within the site".

Cap 118 (1) - Waste Transfer Stations

The local government authorities may designate transfer stations to serve as collection centres of solid wastes to serve cities, or municipalities, or towns or other areas where large amounts of solid waste are generated.

Local Government (Urban Authorities) Act Cap 288 (1982)

The Local Government Act directs the registrar of villages to register an area as a village and issue a certificate of incorporation which enables the village council to become a corporate body with a perpetual succession and official seal; in its corporate name a village is capable of suing and being sued; and a village is capable of holding and purchasing or requiring in any other way any movable or immovable property.

The Act gives authority to local governments to regulate matters that are local. A pertinent example of such authority to the Project is that the local government may opt to regulate extraction of minerals or building material, through their bylaws. Despite the authority of local governments the bylaws should not derogate any principal legislation e.g. in the case of extraction of material, the Mining Act.

Land Acquisition Act No. 47, 1967

The Land Acquisition Act of 1967 stipulates the power and the procedures for acquiring land and the required degree of compensation. The Act repeal and replace the Land Acquisition Ordinance, to provide for compulsory acquisition of lands for public purposes and in connection with housing schemes.

The relevance of this Act relates to the compensation of land taken and loss of properties of the people affected by the project.

Public Health Act No. 1, 2009

This Act provides for the promotion, preservation and maintenance of public health with a view to ensuring the provisions of comprehensive, functional and sustainable public health services to the general public. Public Health Act also addresses the protection of the environmental health and sanitation including healthcare waste management.

The central theme of this act is to provide for the promotion, preservation and maintenance of public health with a view to ensuring the provisions of comprehensive, functional and sustainable public health services to the general public and to provide for other related matters. Major issues addressed in this act include operation of housing & hygiene, human settlements, solid & liquid waste, food & nutrition, control of diseases and workers' health. Relevant sections of this Act related to the implementation of this project include the following:

Section (81) Transportation and Disposal of Liquid Waste

a) The authority shall ensure that sewage from cesspool and sludge from septic tanks are collected and transported by specified vehicles for liquid waste disposal;
b) Ensure that sewage is appropriately treated prior to its discharge into water bodies or open land, the sewage will not increase the risk of infections or ecological disturbance and environmental degradation;
c) Designate and ensure compliance with designated disposal ponds, sewage treatment facilities and sewer points.

Section 73(1)(c): To collect, transport and dispose of solid and liquid waste from buildings, premises and land.

These sub sections are relevant in the operation of the Surface Water Drainage System Sub-project in Kinondoni as it describes the manners in which solid and liquid waste will be collected, transported and disposed appropriately particularly during operation phase.

Occupational Health and Safety Act No. 5, 2003

The Occupational Health and Safety Act repeal the Factories Ordinance. It is an Act designed to make further provisions for securing the safety, health and welfare of persons at work; it provides for the protection of persons at work against hazards to health and safety arising out of or in connection with activities of persons at work; and provides for other health matters.

The current Occupational Health and Safety (OHS) Act aims at protecting the safety, health and welfare of people engaged in work or employment. The goal of occupational safety and health act is to foster a safe and healthy working environment for all employees.

Some of other important goals of this act include:

- Review of the effectiveness of health and safety measures;
- Identification of Potential hazards /incidents in a factory / workplace;
- Examination of major causes of incidents at the factory or workplace and;
- Internal health or safety auditing.

The relevance of this act relates to the construction and operation of the Surface Water Drainage System where risks of injury may occur and where workers will be required to apply safety gears such as boots, hand gloves and masks to ensure their safety during the operation phase.

Water Resources Management Act No. 11, 2009

The Water Resources Management Act (WRMA) repeals the Water Utilisation (Control and Regulation) Act No. 42 of 1974.

This law coves issues of institutional and legal framework, principles for water resources management and prevention and control of water pollution. It established the National Water Board, BWB, catchments and sub-catchments and offences and penalties.

The objective of the WRMA is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled to meet the basic human needs of present and future generations.

The EIA will be developed taking into account this act and mitigate the impacts on water resources in their quantity and quality aspects.

Water Supply and Sanitation Act No.12, 2009

The Water Supply and Management Act established the legal framework to the management and adequate operation and transparent regulation for water supply and sanitation services with a view to give effect to the National Water Policy, 2002.

The Act outlines the responsibilities of government authorities involved in the water sector, establishes Water Supply and Sanitation Authorities as commercial entities and allows for their clustering where this leads to improved commercial viability. It also provides for the registration and operation of Community Owned Water Supply Organisations and regulates the appointment of board members.

The design and implementation of the project will take into consideration the provisions of water supply and sanitation especially those which relate to the potential interruption of utility services for water and sanitation.

Mining Act No. 5, 1998 repealed 2010

The mining act regulates the law relating to prospecting for minerals, mining, processing and dealing in minerals, to granting, renewal and termination of mineral right, payment of royalties, fees and other charges and any other relevant matters. Mining license applicants are required to submit plans for environmental protection.

The relevance of this Act for the rehabilitation of Sinza River and for the construction of the detention ponds relates to the possible need for earth materials acquisition and gravel for the construction activities. In order to minimize the environmental impacts associated with this operation recourse should be made preferably in quarries which area already licensed and in operation.

Urban Planning Act No. 8, 2007

The Urban Planning Act No. 8 of 2007 regulates land use in the country. It requires the occupier to pay land rent in order to get the Certificate of Occupancy.

Other conditions stipulated in the act include:

- Erecting building by using permanent materials designed for the building in accordance with the condition of the issued Right of Occupancy.
- Conforming to the building line decided by the Authority.
- Providing plans for the building showing position of the building.
- Submitting drawings, elevations, plans and specifications to the Authority.
- Maintaining buildings in good order and repair to the satisfaction of the Commissioner for Lands.
- Protecting all beacons on land and re-establishing at the occupier's expenses as assessed by the Director of Surveys and Mapping.
- Providing adequate water supply, drainage and disposal of trade refuse and effluent to the satisfaction of the Authority.
- Fencing the land with good quality fencing and provide car parking as required by the Authority and provide loading and unloading facilities within the boundaries of land.

The Act gives the Commissioner for lands absolute discretion to give or withhold building consent.

The project will respect the individual right of occupancy as prescribed in the Act. Thus, the improvement of storm water drainage will be carried out carefully without affecting public or individual plots and shall make compensation for any acquired land or damage caused. The project proponent will collaborate with local authority to ensure enforcement of the legislation and by-laws regarding solid waste disposal and discharge of effluents from residential areas.

Land Act No 4, 1999

Compensation under Section 156 of the Land Act No. 4 of 1999 applies for non-governmental corporate body, institutions, or group of persons. Section 156 of the Land Act 1999 requires compensation to be paid to any person for the use of land of which he / she is in lawful or actual occupation as a communal right of way and with respect to a way leave. These include:

- Any damage suffered in respect of trees, crops, and buildings as result of creation of way leave;
- Damage due to surveying or determining the route of that way leave.

It is the responsibility of the government department of Ministry, Local Government authority or corporate body that applied for right of way to pay compensation.

The construction of storm water drainage system could lead into destruction of trees, utilities, buildings, or private properties, hence requiring compensation to be effected people according to

existing legislation. The project proponent will pay compensation in accordance to the requirements stipulated in the legislation.

Energy and Water Utilities Regulatory Authority, 2001

This Act consolidates the laws in relation to energy and water utilities in Tanzania Mainland. Under this Act, the Energy and Water Utilities Regulatory Authority (EWURA) with prior approval of the Minister, make rules in respect of the regulated goods and services (being the electricity, petroleum, natural gas, water and sewerage sectors). The Act gives EWURA the legal mandates to issue renew and cancel licenses of service providers in the regulated sectors.

Employment and Labour Relations Act, 2004

This Act entails provisions for all core Labour rights and related matters including to; establish basic employment standards, provide a framework for collective bargaining, provide for the prevention and settlement of disputes. As the proponent shall employ people during construction and operation of the proposed project should make sure that all the requirement of this Act are adhered to. The proponent shall ensure that promotes an equal opportunity in employment and strives to eliminate discrimination in any employment policy or practice. The proponent should provide the legal framework for effective and fair employment relations and minimum standards regarding conditions of work.

Workers Compensation Act, 2008

This Act provides for compensation to employees for disablement of death caused by or resulting from injuries or diseases sustained or contracted in the course of employment and establishment of Fund for administration and regulation of workers compensation. Under this Act, the Contractor shall be obliged to compensate employees in case of injuries, death, and diseases while rendering their services to the employer. The proposed project will involve construction and operation phases which may subject workers into injuries or health risks. It is therefore a responsibility of the project proponent to make sure that all requirements of this Act and working standards are adhered to in order to ensure safe working environment for workers and prevent accidents and other occupational health and safety risks.

Engineers Registration Act and its Amendments 1997 and 2007

The Acts regulate the engineering practice in Tanzania by registering engineers and monitoring their conduct. It establishes the Engineering Registration Board (ERB). Laws require any foreign engineer to register with ERB before practicing in the country. Foreign engineers working with this

project shall abide to the law requirement. The proponent is advised to engage only registered engineers.

The Contractors Registration Act (1997)

The Contractors Registration Act requires contractors to be registered by the Contractors Board (CRB) before engaging in practice. It requires foreign contractors to be registered by the Board before gaining contracts in Tanzania. The Kinondoni Municipal council shall comply with the law requirement during the recruitment of contractors for project implementation.

Public Health, Sewerage and Drainage Ordinance, Chapter 336

The ordinance seeks to make provision for the preservation of public health by measures of sewerage, drainage and sanitation. Under this Ordinance the municipal and town councils as well as township authorities have the duty to construct and maintain public sewers and sewage disposal works. The discharge of industrial effluent into public sewers is restricted, such discharge being only feasible where there is an agreement between a local government authority and the industry or factory concerned.

3.3 REGULATORY/INSTITUTIONAL FRAMEWORK

Environmental Impact Assessment Guidelines and Audit Regulations, 2005

These Regulations provide rules related to the procedures for carrying out environmental impact studies and environmental audits as provided in the Environmental Management Act. They prohibit the carrying out projects without an environmental impact assessment required under the Environmental Management Act and define the contents and form of an environmental impact assessment and the basic principles of an environmental audit.

A developer shall apply for an environmental impact assessment certificate as prescribed by these Regulations. The final decision on an environmental impact assessment shall be taken by the Minister. The Regulations also provide for public hearings in relation with environmental impact assessments and appeal against decisions of the Minister.

Environmental Standards

In terms of section 140 of the EMA, the National Environmental Standards Committee of the Tanzanian Bureau of Standards (TBS) is required to develop, review and submit proposals for environmental standards relating to: water quality, discharge of effluent, air quality, noise and vibration, subsonic vibration, ionising and other radiation, soil quality, noxious smells, light pollution, electromagnetic waves and microwaves.

Air Quality Standards Regulations, 2007

This regulation aims to set baseline parameters on air quality and emissions based on a number of practical considerations and acceptable limits and enforce minimum air quality standards prescribed by the National Environmental Standards Committee.

It helps developers such as industrialists to keep abreast with environmentally friendly technologies aiming to ensure the protection of human health and the environment from various sources of pollution.

The relevance of this standard to the project is reflected in section 1(3)(d) where it states the objectives of this standard among others, is "to ensure protection of human health and the environment from various sources of pollution".

Soil Quality Standards Regulations, 2007

The Soil Quality Standards Regulation provides a framework for environmental protection considerations by different sectors into the mainstream of decision making to ensure minimum environmental negative impacts due to agricultural practices and use of external inputs. It requires the agriculture sector to ensure food security and eradication of rural poverty through the promotion of production systems, technologies and practices that are environmentally sound, with emphasis on strengthening of environmentally sound use, monitoring, registration and management of agro-chemicals use.

There is a risk for soil pollution at the construction sites generally limited to accidental spillages of hydraulic oil, fuel oil and petroleum at individual work sites and along the drainage routes.

The contractor shall comply with these regulations concerning the control and abatement of soil pollution.

Solid Waste Management Regulations, 2009

These documents regulate the implementation of the EMA (2004). The regulations are guided by three principles: the precaution principle, the polluter pays principle and the producer extended responsibility principle, meaning that manufactures or any person exercising jurisdiction under this Act shall, in relation to any decision, order, exercise of any power or performance of any function, be guided by these principles of environment and sustainable development relevant to waste disposal and management.

Local governments implement the regulations and Schedule 1 of the regulations highlight the types of waste and recommended modes of treatment for the same. The contractor and proponent for the drainage project will be expected to comply with these regulations when dealing with solid waste.

Water Quality Standards Regulations, 2007

The object of these Regulations is to protect human health and to promote the conservation of the environment, enforcing minimum water quality standards prescribed by the National Environmental Standards Committee. At the same time the water quality standards enable the National Environmental Standards Committee to determine water usages for purposes of establishing environmental quality standards and values for each usage and ensure that all discharges of pollutants take into account the ability of the receiving waters to accommodate contaminants without detriment to the uses specified for the waters concerned.

Since the interventions under the Sub-project will be held in Sinza River, the risk of water contamination during construction phase is high, particularly in regard to accidental spillages of oil and fuel from the vehicles and machinery allocated to works.

The Contractor shall comply with all applicable regulations concerning the control and abatement of water pollution.

The Land (Assessment of the Value of Land for Compensation) Regulations, 2001

These regulations provide the possibility of claiming for compensation for land or "unexhausted improvement" to be paid by the Government. The assessment basis shall be the market value of the land and certain allowances may be granted: Compensation for loss in any interest in land shall include the value of unexhausted improvement, disturbance allowance, transport allowance, accommodation allowance, and loss of profits.

All affected people in this project will be compensated as stipulated in this regulation.

3.4 INSTITUTIONAL/ADMINISTRATIVE FRAMEWORK

According to the EMA of 2004 the institutional set-up for environmental management from national level to village level includes:

- National Environment Advisory Committee;
- Minister Responsible for Environment;
- Director of Environment (DOE);

- National Environment Management Council (NEMC);
- Sector Ministries;
- Regional Secretariats; and
- Local Government Authorities (Municipality and District, Ward and Village).

The Office of the DOE and NEMC are the main regulatory bodies for environmental management in Tanzania. However, other sector ministries and agencies, play an important role in implementing environmental policy objectives. The environmental management functions of each institution are outlined in the Environmental Management Act and here presented in brief in **TABLE 7**.

The following table presents the main institutions involved and responsibilities.

TABLE 7

RESPONSIBILITIES OF INSTITUTIONS

Administrative level	Institution	Responsibility
National	Vice President's Office, Minister Responsible for Environment	• Responsible for approval of the Environmental Impact Assessment; • Coordinate and monitoring environmental issues; • Environmental Planning; • Environmental research.
	National Environmental Management Council (NEMC)	• Undertake enforcement compliance; • Review and monitoring of the EIA; • Facilitate public participation in environmental decision making; • Disseminate environmental information; • Carry out environmental audits.
	Ministry of Lands, Settlement and Housing Development	• Land use planning; • Valuation and compensation; • Issuing of right of occupancy.
	Ministry of Works	• Issuing policy and guidelines.
District	Prime Minister's Office – Regional Administration and Local Government (PMO-RALG)	• Carrying out EIA study; • Project implementation including mitigation measures; • Carrying regular environmental monitoring and internal audit.
	Local Government Authorities – Kinondoni Municipal Council	• Responsible for overseeing municipal development activities and issuing of permits; • Issuing permission to conduct any activity in the municipality; • Responsible for monitoring the project implementation activities for the benefit of municipal environment; • Ensure the implementation of mitigation measures of the project as recommended in the EMP.
	District Departments of Planning, Natural Resources, Health, Lands, Community Development and Education	• Baseline data on socio-economic conditions; • Extension services; • Plan and coordinate activities on community-based natural resources and environmental management in their areas of jurisdiction.
Community	Ward and Village Offices	• Provide the link between the project development and the community;

Administrative level	Institution	Responsibility
		• Overseeing the environmental matters at ward level.

(PROCESL/COWI, 2014)

3.1 WORLD BANK SAFEGUARDS

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.

World Bank Safeguard Policies considered:

- OP[3] 4.01/BP[4] 4.01Environmental Assessment
- OP 4.11/BP 4.11 Physical Cultural Resources
- OP 4.12/BP4.12 Involuntary Resettlement

OP/BP 4.01 - Environmental Assessment

Environmental Assessment (EA) is used in the World Bank to examine the environmental and social risks and benefits associated with Bank lending operations.

This policy requires Environmental Assessment (EA) of projects 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 investments under the DMDP and on potential environmental impact of the Sub-Project under Dar es Salaam metropolitan area.

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 transboundary and global environmental aspects.

The DMDP has classified this project as a Category "B" project under the World Bank's environmental and social safeguard policies.

Although an EIA is not always required, some environmental analysis is necessary. Category B projects have impacts that are 'less significant, not as sensitive, numerous, major or diverse. Few, if any, impacts are irreversible, and remedial measures can be more easily designed. Typical projects include rehabilitation, maintenance, or upgrades, rather than new construction.

[3]Operational Policy
[4]Bank Procedure

OP/BP 4.11 Physical Cultural Resources

The World Bank Operational Policy (OP) 4.11 aims to protect physical cultural resources, defined as "movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance". These resources "are important as sources of valuable scientific and historical information, as assets for economic and social development, and as an integral part of a people's cultural identity and practices".

This policy applies to all projects requiring a Category A or B Environmental Assessment under OP 4.11, project located in, or in the vicinity of, recognized cultural heritage sites, and projects designed to support the management or conservation of physical cultural resources.

Physical cultural resources and cultural heritage sites are not located in the project area.

Although it is not expected that the proposed project will have effects to physical cultural resources and cultural heritage, appropriate conservation of archaeological artefacts and cultural values and its chance finds during construction and maintenance of the main infrastructure works will have to be considered.

OP/BP 4.12 Involuntary Resettlement

The World Bank Operational Directive (OD) 4.30 on Involuntary Resettlement and the World Bank Operational Policy (OP) 4.12 on Involuntary Resettlement were consulted while preparing the Resettlement Action Plan (RAP).

The main features OP 4.12 that have been considered in the assessment include the following:

- Involuntary resettlement should be avoided whenever feasible, or minimized, exploring all viable alternative project designs;
- Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share the project benefits; and
- Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

3.2 INTERNATIONAL TRITIES AND AGREEMENTS

Tanzania is a party to several international agreements and conventions relating to the environment. The proposed project is required to comply with those international agreements for which Tanzania has ratified. Agreements of potential importance are briefly described below.

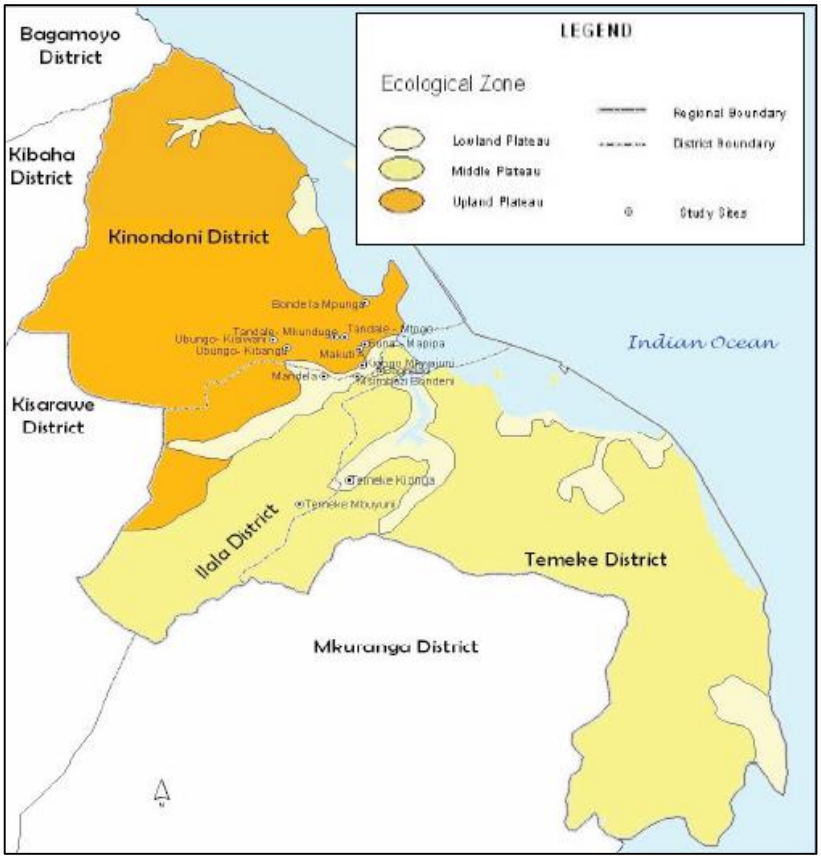
- Tanzania has ratified the UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention 1972). Project proponent has the obligation as well to preserve any cultural heritage found in the project site.
- Convention concerning Protection of Workers against Occupational Hazards in the Working Environment due to air pollution, noise, vibration and radiation. The aim is to ensure safe working environment for the workers. Tanzania adopted it in 1977 and became into force on May 30th 1984.
- Convention on Biological Diversity (CBD): species need to be protected especially endangered and threatened ones. The proposed project however, is not located in the sensitive area that is rich in biodiversity. However, pollution to soil, air and water may affect the existence of some species. It is the obligation of the project proponent to avoid pollution as is practically possible.

CHAPTER 4.0: ENVIRONEMNTAL AND SOCIO-ECONOMIC BASELINE CONDITIONS

4.1 BIOPHYSICAL CHARACTERISTICS

4.1.1 Topography

Dar es Salaam city is divided into three zones, namely the upland zone comprising hilly areas to the west and north of the city, the middle plateau, and the lowlands, which include Msimbazi Valley, Jangwani, Mtoni, Africana and Ununio areas (**FIGURE 6**).

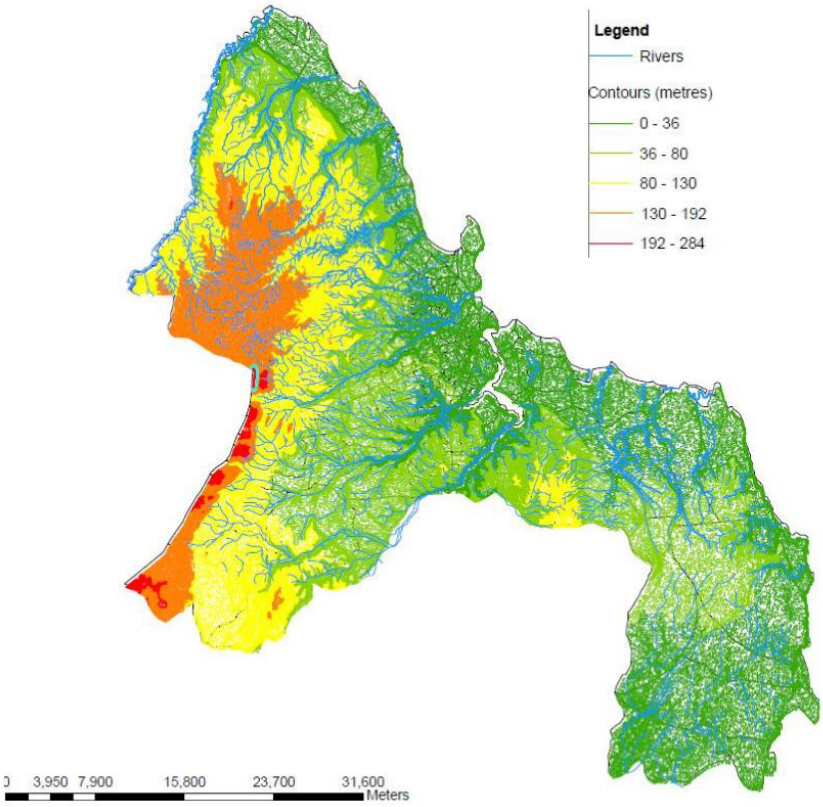


(PROCESL/COWI, 2014)

FIGURE 6

MAP OF DAR ES SALAAM MUNICIPAL DISTRICTS AND GEOMORPHOLOGICAL ZONES

Topographically the city lies in the flood plain and/or near flood plains and thus flooding is one characteristic of the city, particularly when there are heavy rains. The beach and shoreline comprise sand dunes and tidal swamps. Coastal plains composed of limestone extend 10 km to the west of the city, 2-8 km to the north, and 5-8 km to the south. Inland, alluvial plains comprise a series of steep-sided U-shaped valleys. The upland plateau comprises the dissected Pugu Hills (Dongus, 2000). The local topographical conditions can be seen in **FIGURE 7** below and in **TABLE 8**.



(PROCESL/COWI, 2014)

FIGURE 7

MAP SHOWING THE TOPOGRAPHY OF DAR ES SALAAM REGION

TABLE 8

LOCAL TOPOGRAPHICAL CONDITIONS IN DAR ES SALAAM

Topography	Level	Condition
Lowland	< 5 m	Areas at the bay area, river mouths and hinterland along the coast. Marsh and swampy areas widely spread; soft soil, thick and drains poorly.
Plain/Terrace	5-20 m	Flat plans/terraces, extend along the coast and are generally a few kilometres wide. Geologically it belongs to the coastal plain.
Terrace/Hill	20-60 m	This makes up the dominant part of the residential terrain of Dar es Salaam and are gently sloped areas, consisting of residual weathered limestone (Murram-earth material); many of these terraced areas of 500 m to 1 000 m are observed around the banks of Dar es Salaam city, and have been known to act as flood plains.
Hill	60-150 m	This zone extends to the Southwest of the study area, the geological origin of which is raised coral reefs, the undulation of which is dependent on the degree of weathering.
Mountain	> 150 m	In the Western region of Dar es Salaam, 30 km inland, composed of limestone associated with sandstone of the older geological area, steep and rigid slopes are formed.

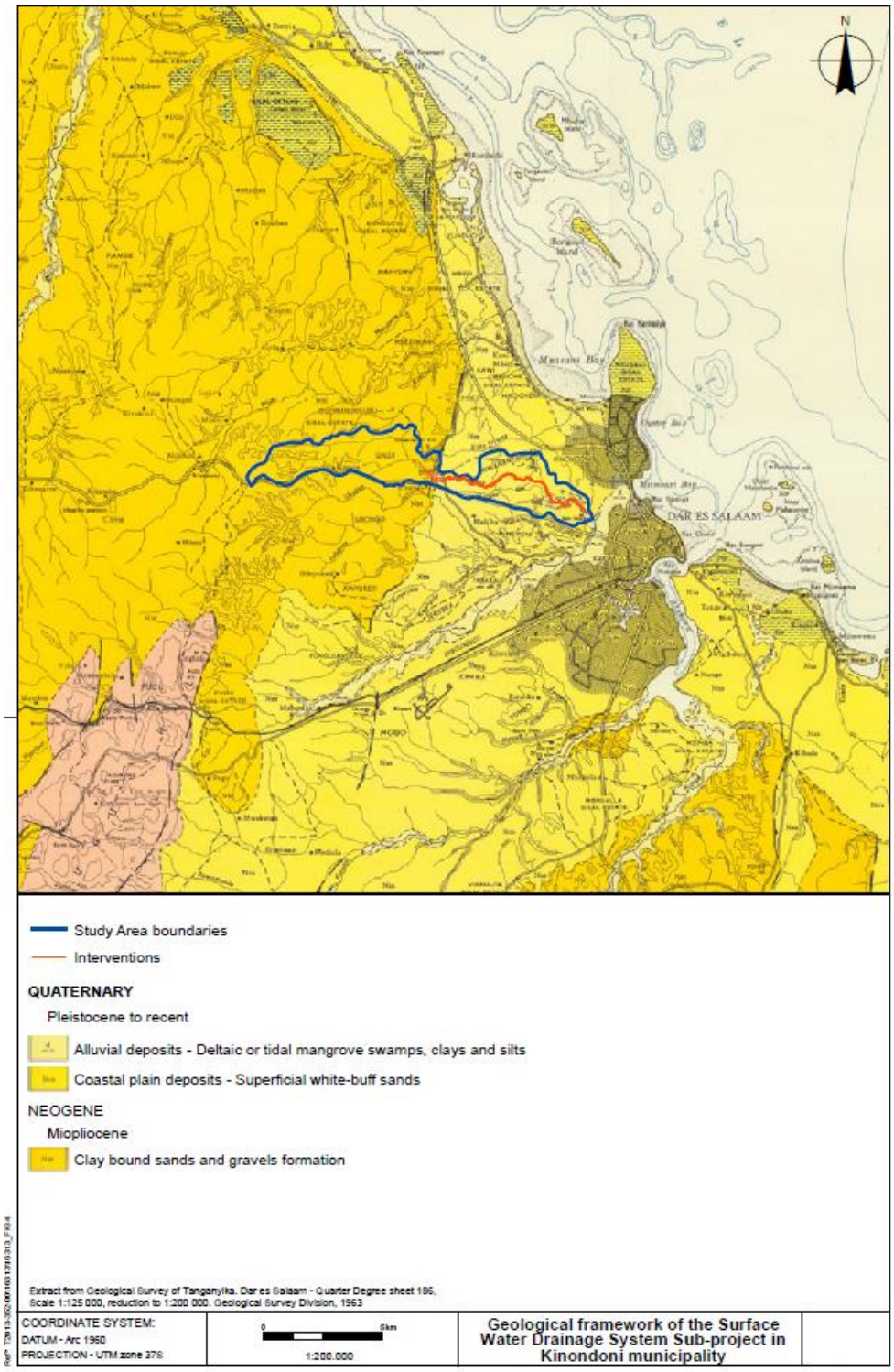
(PROCESL/COWI, 2014)

Specifically, the topography of the Core Impact Area can be considered to be flat, with the highest elevation of about 35 meters from the terrain and the lowest levels being less than 3 metres.

4.1.2 Geology and soils

Geology

According to the Quarter Degree Sheet 186 of the Geological Survey of Tanganyika (1963) (**FIGURE 8**) the study area has two major geological units: (i) the underlying substratum of (semi-) consolidated formations and outcropping rocks that consist of Neogene clay-bound sands to hard sandstone; and (ii) the superficial mainly loose sediments of the Quaternary System which are more extensive in the central and southern parts of Dar es Salaam region and consisting of less consolidated terrace sands and sandstones and recent alluvium (Mtoni *et al*., 2012).



(Adapted from Geological Survey of Tanzania, Dar Es Salaam Quarter Degree sheet 186, PROCESL/COWI, 2014)

FIGURE 8

GEOLOGICAL FRAMEWORK OF THE SURFACE WATER DRAINAGE SYSTEM SUB-PROJECT IN KINONDONI MUNICIPALITY

Soils

The soil is a finite, limited and non-renewable resource. The degradation processes associated with loss of ability to perform its functions are reflected in its inability to maintain or sustain vegetation.

It is on this basis that it is important to analyse the types of soils in the study area of the project whose physical and chemical characteristics associated with external factors provide greater or lesser suitability for their use.

Soil types map of Tanzania was used for the identification of soils that occur in the study area (scale 1: 5 000 000, Soil Map of the World; latest version presented in 1988) where the soils are distinguished into two taxonomic levels established by this classification. (1) a first level identified with the units correspondent to the designation of major soil groups and; (2) a second level corresponding to the soil-units in which those groups are sub-divided.

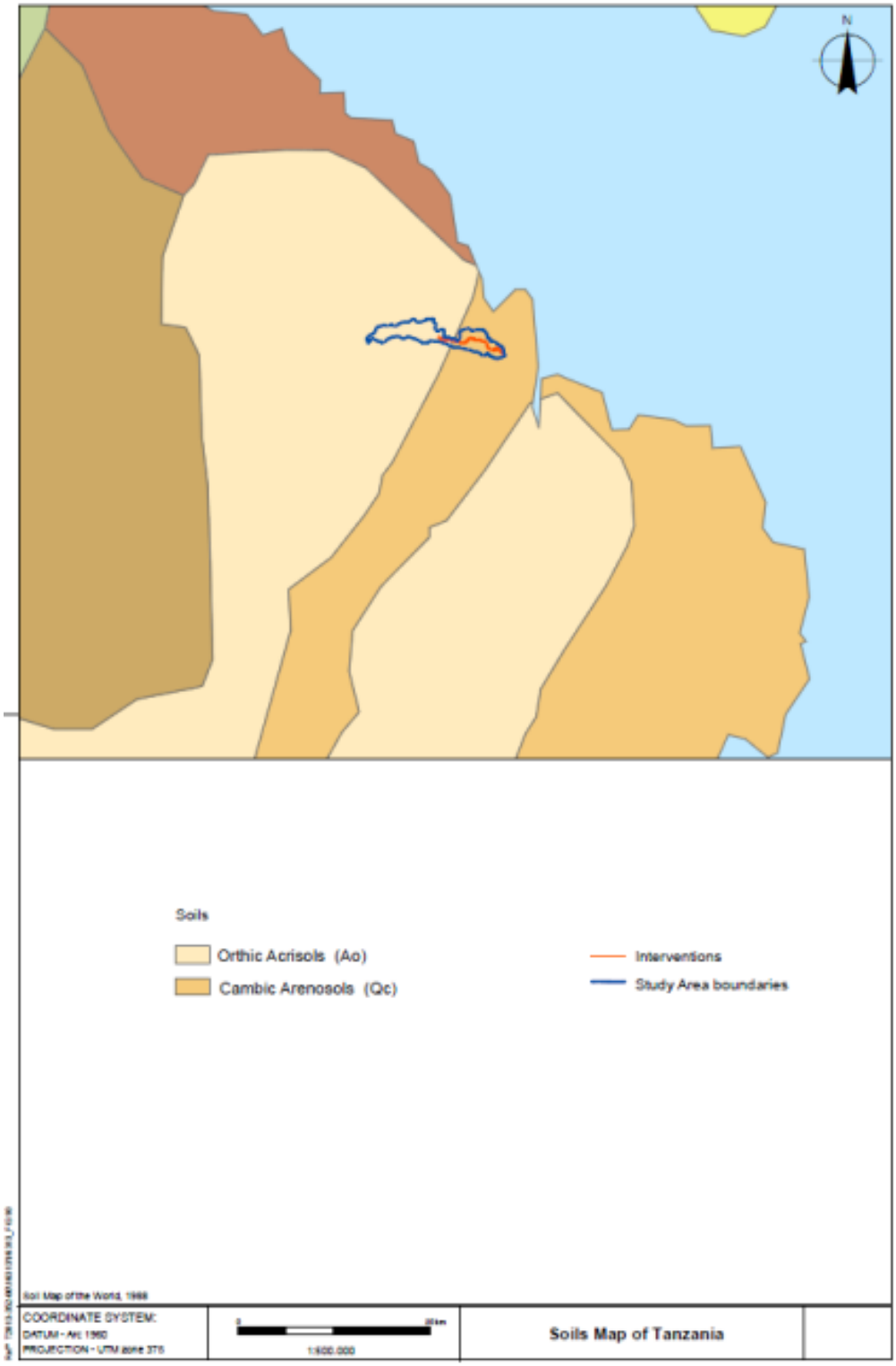
Additionally, the Draft Report of Soils of Tanzania and their Potential for Agriculture Development (2006) was consulted.

Legal framework

As mentioned in chapter 3 Tanzania soils protection is regulated by the Environmental Management (Soil Quality Standards) Regulations, 2007. Considering that the area where will be deployed the detention ponds are natural areas it is important to emphasizes the provisions of paragraph 6 of Part II, in which it is stated that "(...) *every person shall comply with soil quality standards and minimum standard of soil quality standards approved and published under these Regulations*," establishing for this purpose, maximum allowed limits in habitat and agricultural soils for the following pollutants: volatible organic compounds, heavy metals, pesticides and others chemicals.

SOILS CHARACTERIZATION

The thematic map developed for this characterization (**FIGURE 9** presented below) shows the presence of two main groups in the study area, divided on a soil-unit (**TABLE 9**).



(Adapted from Soil Map of the World, PROCESL/COWI, 2014)

FIGURE 9

SOILS MAP OF TANZANIA

TABLE 9

SOILS IN THE STUDY AREA

Main groups	Soil-unit
Acrisols (AC)	Orthic Acrisols (Ao)
Arenosols (AR)	Cambic Arenosols (Qc)

(PROCESL/COWI, 2014)

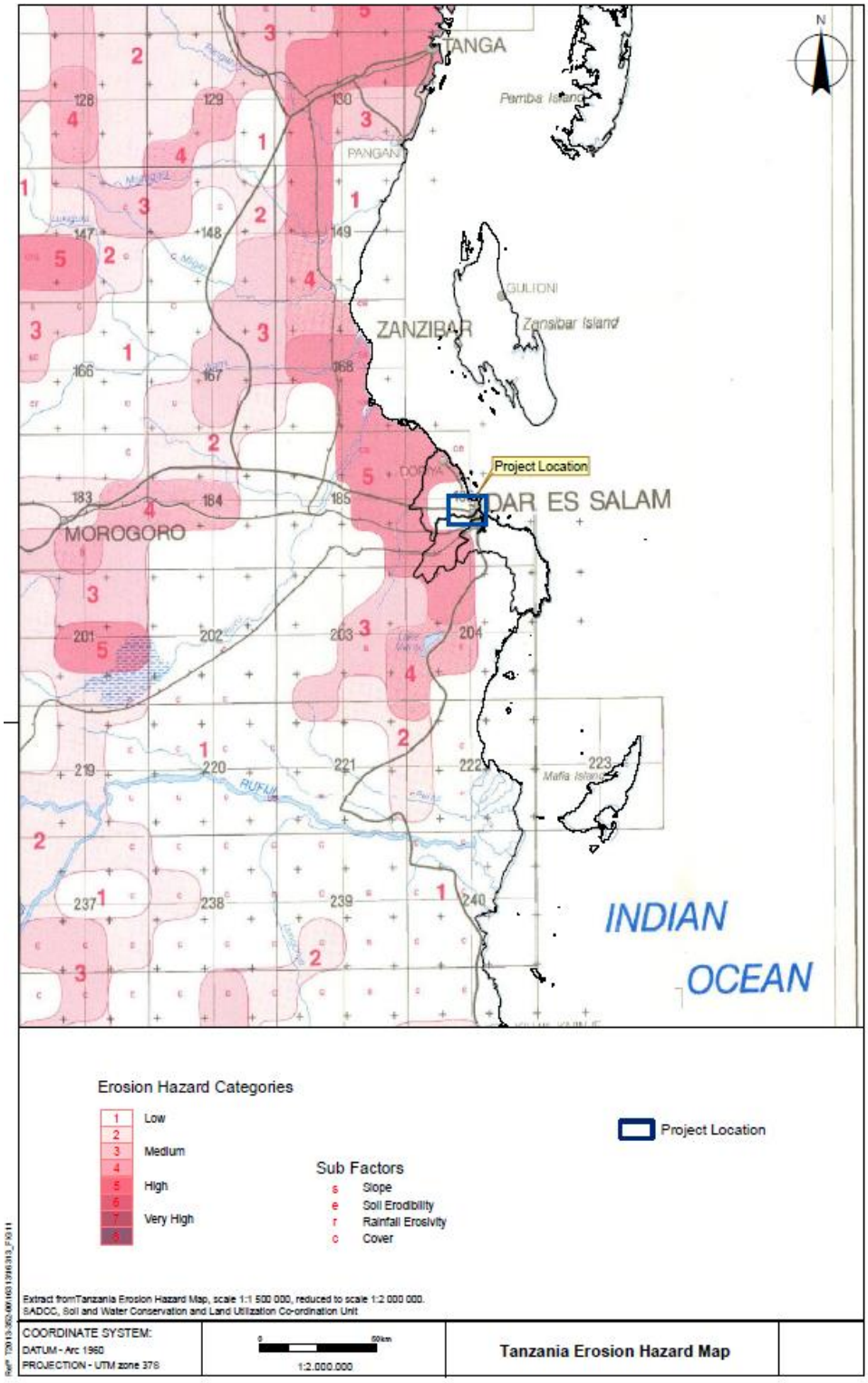
The Soil Group of the **Arenosols (AR)** occurs in the study area where interventions will be carried out between Kawawa road to, approximately, Shekilando road. These types of soils are sandy soils, whose formation is conditioned by the particular properties of their parent material, usually quartz-rich soil material or rock, and soils developed in recently deposited sands. In the French classification system (CPCS, 1967), Arenosols correlate with taxa within the "Classe des sols minéraux bruts" and the "Classe des sols peu évolués". Other international soil names to indicate Arenosols are `siliceous, earthy and calcareous sands' and various `podsolic soils' (Australia), `red and yellow sands' (Brazil) and the Arenosols of the FAO Soil Map of the World. Arenosols occur in vastly different environments and possibilities to use them for agriculture vary accordingly. All Arenosols have a coarse texture, accountable for the generally high permeability and low water and nutrient storage capacity and present a very low fertility.

The Soil Group of the **Acrisols (AC)** occurs in the study area where interventions will be carried out between Shekilando road and the detention ponds area at Maji-Ubungo. These soils are typically red and yellow of wet tropical and subtropical regions. They are characterized by accumulation of low activity clays in an argic subsurface horizon and by a low base saturation level. Acrisols correlate with `Red-Yellow Podzolic soils" (e.g. Indonesia), "Podzolicos vermelho-amarello distroficos a argila de atividade baixa" (Brazil), "Sols ferralitiques fortement ou moyennement désaturés" (France), "Red and Yellow Earths" and with several subgroups of Alfisols and Ultisols (Soil Taxonomy, USA).

Acrisols are acid soils rich in kaolinite, poor in nutrient, of low fertility and accumulate clay in the subsoil.

RISK OF EROSION

The Tanzania Erosion Hazard Map (scale 1:1 500 000, to reduce scale 1:2 000 000), published by the Southern African Development Coordination Conference (SADCC) (**FIGURE 10**) was used to identify and analyse erosion risk areas within the project area. In this map the risk of erosion is classified into four classes [low, medium, high and very high] associated to a combination of factors, natural and anthropic and listed in the following table, each with a specific action (**TABLE 10**).



(Adapted from Tanzania Erosion Hazards Map, PROCESL/COWI, 2014)

FIGURE 10

TANZANIA EROSION HAZARD MAP

TABLE 10

EROSION FACTORS

Factors		Action
Natural	Slope	The higher the slope, the greater the flow rate and consequently, minor is the susceptibility to erosion.
	Soil erodibility	Influences the erosion resistance. The higher the erodibility of soil, the lower is its resistance and consequently the higher the susceptibility to erosion.
	Rainfall erosivity	Increase the intensity of erosion. The higher the rainfall erosivity, greater the risk of erosion.
Anthropic	Cover	Influence exposure to erosion. The higher the vegetative soil cover, the greater the resistance to impact of rainfall and infiltration, reducing runoff and consequently minor to erosion susceptibility.

(PROCESL/COWI, 2014)

(Adapted from Tanzania Erosion Hazards Map, PROCESL/COWI, 2014)

FIGURE 10 suggests the following conclusions:

- The study area has a low risk of erosion;
- The synergetic effects of natural factors have small influence in determining the risk of erosion. Although identified soil conditions give them high susceptibility to erosion, the associated relief, essentially flattened, wavy with almost zero or very weak slopes, decreases the flow conditions and the slow surface runoff decreases the risk of erosion;
- The risk of erosion results primarily from human activity, mainly by inadequate management of soil, where the plant cover is replaced by relatively dense urban areas with sparse vegetation.

There are several erosive evidences observed in the study area. The most threatening phenomena is siltation in the river bed caused by spoils of waste improperly thrown by local people into the rivers. This situation further aggravates the existing flooding problems (**PHOTO 5**).

PHOTO 5

EROSION ON SOILS AND DEPOSIT OF DEBRIS, SINZA RIVER BANKS

4.1.3 Climate

Characterizing the climate of a region will contribute to the prediction and evaluation of impacts on other environmental factors such as air quality and water resources since it is not expected that the project, given its characteristics, lead to changes in climate and weather conditions prevailing, both locally than regionally.

Dar es Salaam is located in the East African region within an equatorial type of climate. Tanzania generally lies in the tropical savanna belt while Dar es Salaam is located in the wetter and warmer coastal area. The climate in the coastal region is characterized by relatively high annual precipitation, well over 1000 mm per year.

According to Dar es Salaam City Profile[5] the city experiences a modified type of equatorial climate. It is generally hot and humid throughout the year with an average temperature of 29ºC. The hottest season is from October to March during which temperatures can raise up to 35ºC. It is relatively cool between May and August, with temperature around 25ºC.

There are two main rain seasons; a short rain season from October to December and a long rain season between March and May. The average rainfall is 1000 mm (lowest 800 mm and highest 1300mm). 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.

Tanzania has been assessed and divided into climatic zones (Dry, Moderate and Wet) as described by the Tanzania Pavement and Materials Design Manual, 1999. This documentation gives relevant guidance on pavement and earthworks design standards in relation to prevailing climatic conditions. Dar es Salaam falls within the Moderate Zone.

4.1.4 Hydrology and water resources

Sinza River has a length of approximately 21 km and a basin area of 23,1 km^2. Sinza River is a tributary of Msimbazi River which drains to the Indian Ocean and is perennial. These, together with another tributary of Msimbazi River, Ubungo River, are seasonal flooding passing through many informal settlements. During flooding seasons, many of these settlements are abandoned for a period of time.

Like the rest of Dar es Salaam city, rainfall in the Msimbazi River catchment occurs in two seasons: March – June and October – December and the annual rainfall ranges between 1 000 and 1 200 mm.

[5]Dar es Salaam City Profile; Document Prepared By Dar es Salaam City Council with advice from Cities and Health Programme, WHO Centre for Development, Kobe, Japan; November 2004.

Msimbazi, Sinza and Ubungo are all open channels which are prone to interference from the public who frequently dump waste into these watercourses clogging the water ways and leading to flooding.

Water quality

Dar es Salaam is the most industrialized city in Tanzania, accounting for 80% of the country's industries, exerting pressure to its surroundings and overall environmental quality. Many industries like chemical factories, agro-industries, breweries, soap and steel-manufacturing establishments discharge untreated effluents directly or through storm water drainage, river creeks and streams or estuary drainage into the sea.

Surface waters are generally heavily polluted by wastewater originating from those industries, households, road surfaces, drains and small-scale enterprises. On this basis it is likely that shallow surface waters are unsuitable for potable water supply.

Water quality standards and guidelines are set up by the government or international organizations such as the World Health Organization (WHO). In Tanzania the standards are set by the Tanzania Bureau of Standards (TBS).

According to Dar es Salaam Master Plan (2012 – 2032) heavy metal contamination has been reported in several areas of Dar es Salaam. Along the Msimbazi River valley, the concentration of lead in the water exceeds TBS standards and WHO guidelines, with lead and chromium concentration dominate on much of the topsoil. The presence of high levels of heavy metals in soil and water has the potential for pollution transfer from these media to the food chain.

Much of the lead contamination is traffic related, with a strong correlation between average traffic density and soil lead levels. Traffic also contributes to soil contamination with hydrocarbons. [Dar es Salaam Master Plan (2012 – 2032)].

Several other hydrocarbon based industrial activities in Dar es Salaam anticipate an extensive hydrocarbon contamination in the city [Dar es Salaam Master Plan (2012 – 2032)].

Sources of pollution

According to Dar es Salaam Master Plan (2012 – 2032) the major sources of pollution and contamination of waters include:

- Oil refineries, pipelines, tank farms, fuel depots and fuel stations;
- Landfills and self-disposal of waste;

- Industry, particular where these discharge untreated effluents directly or through storm water drainage into water courses or the sea;
- Industry, general contamination (heavy metals, organics, etc.);
- Pit latrines and other forms of sewage treatment/disposal;
- Lead contamination from traffic;
- Hydrocarbon leakages from transport.

Storm water

Storm water drainage is a major issue in Dar es Salaam mainly because of the effect that it has on several basic needs. The lack of adequate, satisfactory and sufficient drainage is the main cause of flooding in the city which, in turn, is one of the biggest impacts on housing, water quality and transportation.

Storm water channels are managed by TANROADS along the trunk roads. Along smaller or informal roads the channel are the responsibility of the local municipality.

The city drainage is broken down into two components, the main drainage system and flood protection structures that are managed by the Dar es Salaam City Council (DCC). The second component is street and local drainage provided by individual landowners [Dar es Salaam Master Plan (2012 – 2032)].

TABLE 11 below presents the length and state of Kinondoni Municipality Council storm water drainage system network.

TABLE 11

KINONDONI MUNICIPALITY COUNCIL TYPE OF STORM WATER DRAINAGE

Type of System	Condition			
	Good (km)	Fair (km)	Poor (km)	Total (km)
Lined	258	---	15	273
Unlined	---	---	145	145
Underground	15	---	10	25
Total	273	---	170	443

(Dar es Salaam Master Plan (2012 – 2032))

Hydrogeology

Groundwater is one of the most important sources of water supply in the world. In highly urbanized areas, like the study area, population growth has led to an increase in socio-economic activities causing an increasing demand for water supply.

In the last two decades, the use of groundwater in Dar es Salaam city has increased considerably due to the scarcity of surface water sources. Since 1997, different organizations have promoted the drilling of boreholes to try to meet the demand of water supply in the city. It is estimated that about 1 000 boreholes are drilled annually (Baumann *et al*., 2005). All these put a strain on the fresh groundwater promoting threats like pollutants contamination and over abstraction that can lead to intrusion of salt water in fresh water aquifers (Mtoni *et al*., 2012).

According to Mtoni *et al*. (2012) over 50% of the residents rely on groundwater for drinking, irrigation and industrial purposes. There are more than 7 500 active boreholes/wells in different locations of the city, extracting water from the Quaternary coastal aquifer and annual exploitation of the aquifer has reached around $69{,}3x10^6$ m^3.

HYDROGEOLOGICAL UNITS

The study area comprises mainly two aquifers both of Quaternary age (Pleistocene to Recent age): an upper unconfined sand aquifer and a lower semi-confined sand aquifer. The upper and the lower aquifers are separated by a clay aquitard. Near to the coastline a third aquifer can locally be identified corresponding to a coral reef limestone aquifer, comprising the reef limestone of Pleistocene to Recent age. Although locally each of the above aquifers are significant, both sand aquifers are the most important in Dar es Salaam for supplying groundwater, compared to the limestone aquifer (Mtoni *et al*., 2012 and Witte, 2012).

The unconfined aquifer

The upper aquifer consists mainly of unconsolidated material, mostly fine to medium sand (with varying amounts of silt and clay) of Pleistocene to Recent age. As mentioned above, a local aquifer consisting of coral reef limestone is present along the coastal strip.

The clay aquitard

The clay layers forms the confining layer between both aquifers. Aquitards may be fragmented, which is the case here especially close to de coast where it is fragmented into different clay lenses.

The semi-confined aquifer and clay layer

The aquifer is also of Pleistocene to Recent age and consists of medium to coarse sands, with varying clay content. It is located between the clay aquitard, which forms the confining layer and the Mio-Pliocene aquitard.

The Mio-Pliocene aquitard

This aquitard consists mainly of clay-bound sands and gravels and correspond to the so-called Kimbiji aquifer. Because of the low permeability of is clayey top and great thickness, it is considered as the lower boundary of the groundwater Quaternary aquifer. The drillings are not deep enough to reach this aquitard (Witte, 2012).

GROUNDWATER RECHARGE

Groundwater recharge mainly occurs during the long rain season (March to June) and to a lesser extent during the short rainy season (October to December) (Mtoni *et al.*, 2012) and it is clear that no recharge will be possible in the dry season. Recharge during the long rainy season accounts for about 85% of the total annual recharge with an important peak in April, whereas recharge occurring during the short rainy season contributes to only 15% of the total annual recharge with a small peak in November (Mtoni *et al*., 2012).

The aquifer contributes to the base flow of the main rivers (Mzinga, Kizinga and Msimbazi) keeping them flowing during the dry period (Mjemah, 2007 *in* Mtoni *et al*., 2012). River channels play a major role in landscape evolution, setting the boundary conditions and are discharge areas for shallow groundwater (Mtoni *et al*., 2012).

GROUNDWATER QUALITY

Coastal aquifers are characterized by interactions between continental and marine conditions (Mjemah, 2007). Groundwater resources in coastal areas are always in danger of contamination by sea water intrusion. In the close proximity to the coastline, this situation has resulted into salinization. Water samples from the city center boreholes and along the coastline from Oysterbay to Msasani and Masaki areas show elevated concentrations of chloride, sulphate and sodium (Mjemah, 2007).

According to Mtoni *et al.* (2012) results from hydro geochemical investigation in the study area indicates that Dar es Salaam Quaternary coastal aquifer is experiencing contamination primarily by seawater intrusion due to overexploitation and the use of on-site sewage disposal systems, in particular pit latrines and leakage from septic tanks showed by an excessive nitrate concentrations.

According Witte (2012) pH varies from 6,02 to 8,20 for the unconfined aquifer and from 5,63 to 9,11 for the semi-confined aquifer.

Both aquifers show very high EC values, with a maximum of 8 490 µS/cm for the unconfined aquifer and 4 720 µS/cm for the semi-confined aquifer. The higher values are found in of Dar es

Salaam City Centre and in the north of the study area. The high EC values indicate salt water intrusion. The temperature showed a slightly higher mean and median value for the semi-confined aquifer compared to the unconfined aquifer. This is due to the geothermal gradient with the depth.

Nitrates show very high concentrations. The source of these higher concentrations is the discharge of sewage water into the streams. These waters contain a lot of ammonium which is oxidized to nitrate.

Over 60% of the city has groundwater with a Total Dissolved Solids (TDS) level of 500-1000 mg/l, indicating good fresh water.

Mato (2002) observed that there are high nitrate levels and bacterial contamination in boreholes located in high residential areas like Buguruni, Manzese and Mabibo. Extreme cases of nitrate concentration (of up to 200 mg/l) were measured in Buguruni area. This proves that in Dar es Salaam the water quality of the aquifers have started to deteriorate.

4.1.5 Ambient air conditions

This chapter aims to characterize the air quality at Kinondoni Sub-project area and its surroundings by presenting the legal framework identification and inventory of possible sources of atmospheric emissions.

Ambient air quality standards are ambient air quality levels established and published through national legislative and regulatory processes, and ambient quality guidelines refer to ambient quality levels primarily developed through clinical, toxicological, and epidemiological evidence, such as those published by the World Health Organization (WHO)[6].

Considering that it is expected that during the construction phase of the project impacts on ambient air quality arise through the emission of dust and exhaust fumes from construction equipment and machinery, it is important to understand the legal framework in relation to air pollution that may be taken preventive and mitigation measures.

The International Finance Corporation (IFC) (World Bank Group) Environmental, Health and Safety (EHS) Guidelines state that emissions should not result in pollutant concentrations that reach or exceed relevant ambient air quality as outlined in the legislative standards, or in their absence, the current WHO Air Quality Guidelines (WHO, 2005). Air quality standards are outlined in

[6]WHO air Quality Guidelines for particulate matter, ozone, nitrogen, dioxide and sulphur dioxide. Global update 2005.Summary of risk assessment, World Health Organization and; Air Quality Guidelines for Europe. World Health Organization Regional Office for Europe Copenhagen WHO Regional Publications, European Series, No. 91 Second Edition, 2000.

"Environmental Regulations and Standards, Tanzania Bureau of Standards, 2007". The standards look at ambient air as well as emissions from stationary sources.

TABLE 12 below presents the ambient air quality Tanzanian Standards and WHO Guidelines.

TABLE 12

AMBIENT AIR QUALITY STANDARDS AND GUIDELINES

Pollutant	Averaging period	Tanzania Standards in µg/m^3 (7)	WHO Guidelines in µg/m^3 (7)(8)
Sulphur dioxide (SO_2)	24-hour	100	125 (Interim target-1) 50 (Interim target-2) 20 (guideline)
	10 minute	---	500 (guideline)
	Annual	40-60	---
Nitrogen dioxide (NO_2)	1-year	100	40 (guideline)
	1-hour	---	200 (guideline)
	8-hour	120	---
	24-hour	150	---
Black Smoke	--	40-60	---
Particulate matter PM_{10}	1-year	60-90	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline)
	24-hour		150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate matter $PM_{2.5}$	1-year	---	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline)
	24-hour	---	75 (Interim target-1) 50 (Interim target-2) 37,5 (Interim target-3) 25 (guideline)
Carbon monoxide (CO)	8-hour	10 000	10 000
	1-hour	30 000	30 000
	15 min	100 000	100 000
	30 min	60 000	60 000

[7]Environmental Management (Air Quality Standards) Regulations, 2007. First Schedule – Permissible weight concentration (emission Limits) from the atmosphere to a receptor and respective test Methods.

[8] Interim targets are provided in recognition of the need for a staged approach to achieving the recommended guidelines.

Pollutant	Averaging period	Tanzania Standards in µg/m^3 (7)	WHO Guidelines in µg/m^3 (7)(8)
Lead (PB)	1-year	2	0,5
Ozone (O_3)	8-hour daily maximum	120	160 (Interim target-1) 100 (guideline)
	1-year	10-100	---

(PROCESL/COWI, 2014)

The air quality is affected by various pollutants. The major sources of air pollution in Dar es Salaam city are motor vehicles (believed to be the primary source affecting ambient air quality), industrial pollution and residential burning of fossil fuels[9]. Other sources include:

- open waste burning;
- biomass burning;
- dust;
- particulate matter;
- high noise;
- vehicular emissions, and;
- Industrial emissions.

According to Dar es Salaam Master Plan (2012 – 2032)[10] residents living in areas within the vicinity of major roads, such as Morogoro Road are likely to be exposed to long-term concentrations of nitrogen dioxide (NO_2) and inhalable particulate matter (PM_{10}) that exceed WHO Guidelines.

Urban Air Quality Monitoring has been undertaken as part of the Air Quality Monitoring Capacity Building Project (ARMCBP).

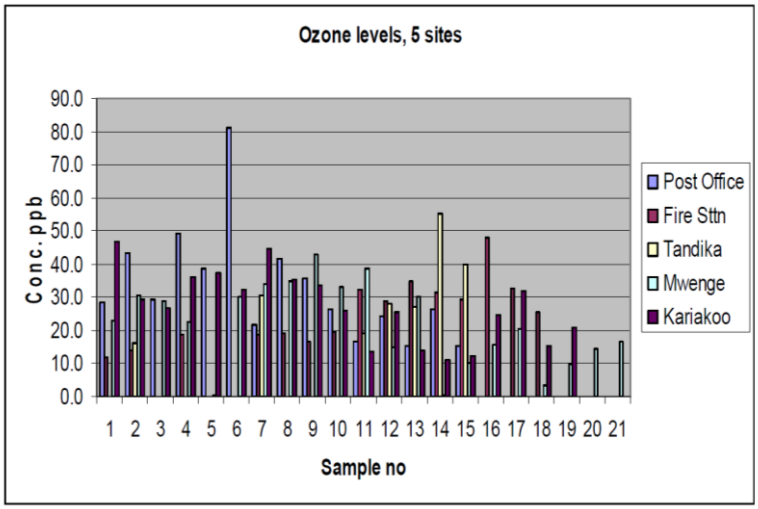
The AQMCBP is a project concluded in 2007 and was implemented in three municipalities of the city of Dar es Salaam with the aim of establishing baseline data and information on the content of selected impurities in ambient air. The major project activities included monitoring of air quality through sampling and establishing a database information on ambient air quality.

Five locations have been selected within the city and a number of pollutants were monitored (PM_{10}, NO_x, SO_x and O_3):

- 2 roadside sites along Morogoro road;
- 2 residential and 1 commercial.

[9] Geofrey Kamukana " The City of Dar es Salaam striving to resolve environmental problems"
[10]Dar es Salaam Master Plan 2012 – 2032. Dodi Moss, Buro Happold, Afri Arch, QConsult, March 2012.

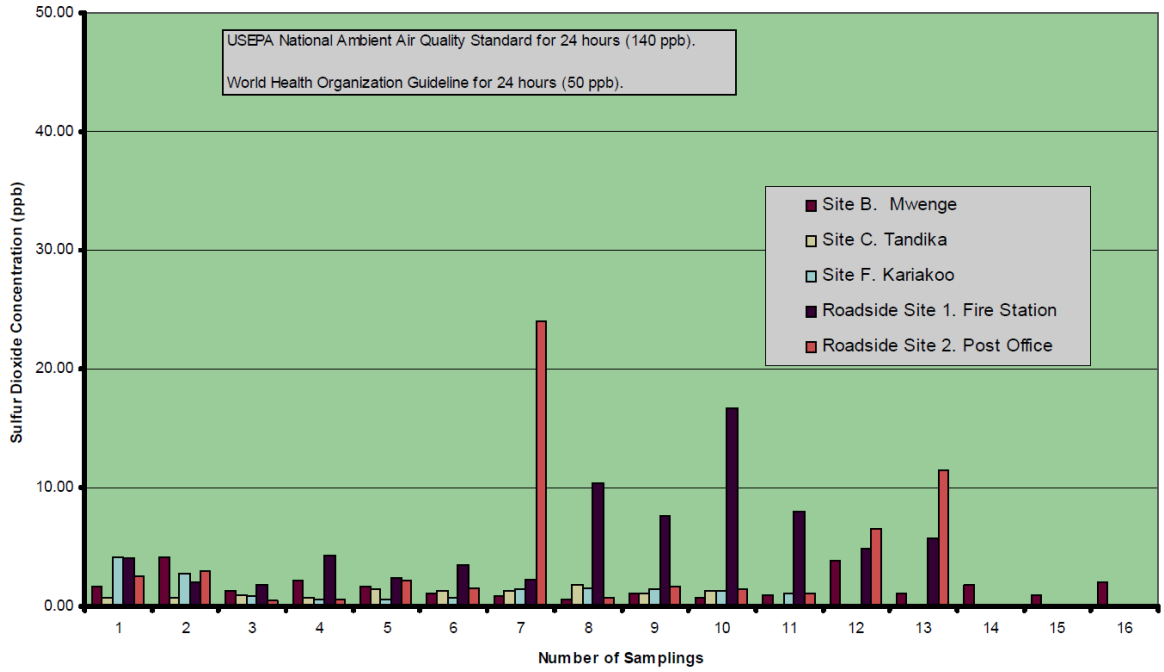
The following figures present the available obtained results.



(Adapted from AQMCBP)

FIGURE 11

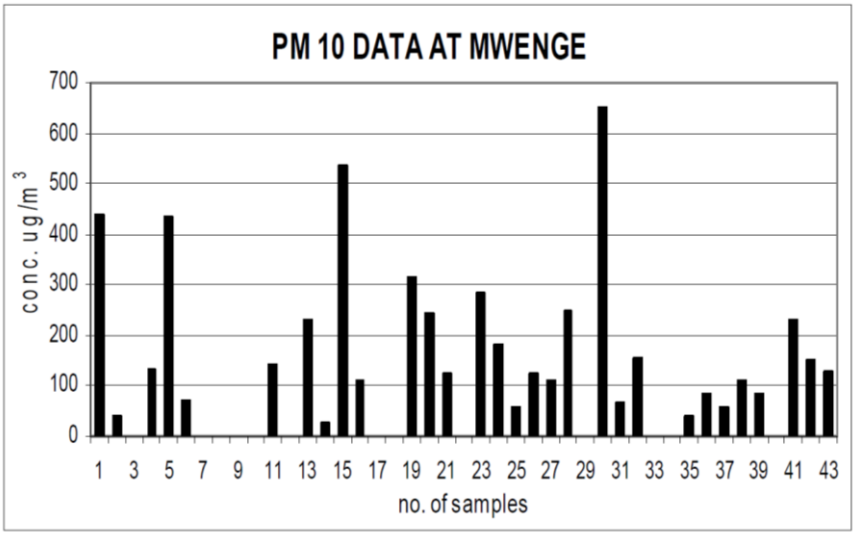
OZONE LEVELS



(Adapted from AQMCBP)

FIGURE 12

SULPHUR DIOXIDE CONCENTRATION



(Adapted from AQMCBP)

FIGURE 13

PM_{10} CONCENTRATION

Despite the distance to the study area, Mwenge site is the one that better characterize the project area.

Analysing the figures, it can be said that only the PM_{10} levels exceeded the pollution limits set in the Tanzania standards and WHO guidelines, presenting average levels above 100 µg/m^3.

The deterioration of air quality in these areas has been, mainly linked with increased traffic volume, industrial activities and the poor state of roads (i.e. unpaved).

4.2 ECOLOGICAL AND ENVIRONMENTAL CHARACTERISTICS

4.2.1 General vegetation (flora)

The vegetation of the project area comprises of crops surrounded by wooded areas (at detention ponds area) or secondary growth vegetation with some woodland area around settlements along Sinza River, mainly coconut palm and banana trees.

At the detention ponds area, at Ubungo, the exotic species commonly observed includes:

Trees and Shrubs

- *Mangifera indica* (Mango tree);
- *Azandiracta indica* (Neem tree or Muarobaini);
- *Solanum macranthum* (Brazilian potato);

- *Bambusa vulgaris* (Golden bamboo);
- *Nerium oleander*;
- *Tectona glandis;*
- *Hibiscus rosa-sinesis.*

Grasses and herbs

- Elephant grasses,
- Chick weed
- Star grasses
- *Hyperhenia* species
- Black jack *(Bidens pilosa)*

The common indigenous species includes *Ricinus communis* (Castor oil plant) and *Hibiscus schizopetalus*.

The riverine vegetation, along Sinza River, is mainly composed by bush thickets mixed with annual herbs, grasses and some trees, mainly palms (**PHOTO 6** and **PHOTO 7**).

(Field work, PROCESL/COWI, 2013)

PHOTO 6

VIEW OF SINZA RIVER (MTO NG´OBE) FROM THE DETENTION PONDS EAST LIMIT (ROAD), WITH ACACIA SP. AT RIGHT

(Field work, PROCESL/COWI, 2013)

PHOTO 7

VIEW OF SINZA RIVER (MTO NG´OBE) AND VEGETATION ASSOCIATED

4.2.2 General wildlife (fauna)

The main fauna found in the project area include domestic animals and some wildlife, predominantly generalist and tolerant to human presence like rodents - house rat (*Rattus rattus*) and giant cane rat (*Thryonomys sp*.), snakes (*Psammophis* spp.), shink (*Mabuya varia*), bufo (*Amietophrynus gutturalis*), other frogs and terrapins (*Pelusios* sp.). North of the project area, at University of Dar es Salaam campus, there are species of carnivores and primates (Senzota 2012).

Among primates, the present species have least ecological concern status. Vervet monkey (*Chlorocebus aethiops*) is extremely adaptable species that can live in both rural and urban environments (Kingdon & Butynski 2008) and lesser galago (*Galago senegalensis*) possibly the most widespread galago species (Bearder *et al*., 2008). Something similar happens with carnivores, those who were found occur in a wide range of habitats, like banded mongoose (*Mungos mungo*) (Hoffmann 2008) or genets (*Genetta* sp.).

In summary, it can be said that the Sub-project area has no remarkable wildlife resources.

4.2.3 Conservation status

The Sub-project area does not contain any forest reserves, National Parks or any form of conservation area as defined in the National Wildlife Policy. The nearest protected area is Pande Game Reserve, located 13km NW the study area **FIGURE 11**).

Pande Game Reserve is an area of Eastern African Coastal Forest in Dar es Salaam Region. It covers 1,226 ha encompassing disturbed forest, thicket, grassland and woodland. Plants of

conservation concern include the three *taxa* which are thought to be strictly endemic to Pande: *Tricalysia bridsoniana* var. *pandensis*, *Sapium sp. nov.* and *Leptactina FTEA sp. A.*

The reserve has a high diversity of bats, some of them with status "Vulnerable" *sensu* IUCN, like Eastern African collared fruit bat (*Myonycteris relicta*). In relation with other mammals, some of the species such as the black and rufous elephant shrew, lesser pouched rat or Syke's monkey indicate affinities with the Eastern Arc Mountains. Pande is also an important area for galagos, with four species recorded in the area: Large eared greater galago (*Otolemur crassicaudatus*), Garnett's galago (*O. garnettii*), Zanzibar galago (*Galagoides zanzibaricus*) and Rondo galago (*G. rondoensis*) (Doggart 2003).

Pande Game Reserve is part of the Eastern Arc / Coastal Forest Biodiversity Hotspot, one of the highest priority areas for biodiversity conservation in the world (Doggart 2003). Pande has also been classified as an 'Important Bird Area' by Birdlife International due to the presence of species like sunbirds (*Anthreptes reichenowi, A. neglectus*), raptors as Southern Banded Snake-eagle (*Circaetus fasciolatus*), Greenbuls (*Phyllastrephus fischeri, P. debilis*) and others (www.birdlife.org).

Kinondoni Municipality is located in one of the biodiversity hotspots for conservation – the Coastal Forest of Tanzania/Kenya (Myers *et al.*, 2000). This area belong the Northern Zanzibar-Inhambane Coastal Forest Mosaic ecoregion that are among areas with highest densities of plant species in the world.

The Northern Zanzibar-Inhambane Coastal Forest Mosaic ecoregion, along with the Eastern Arc montane forests *(http://www.eoearth.org/article/Eastern_Arc_forests)* together, harbour densities of plant species that are among the highest in the world.

According to the World Wildlife Foundation (WWF) the ecoregion supports a large number of endemic species, at a density among the highest in the world. These endemics are concentrated in the forest areas, but are also found in drier bushland and grassland habitats.

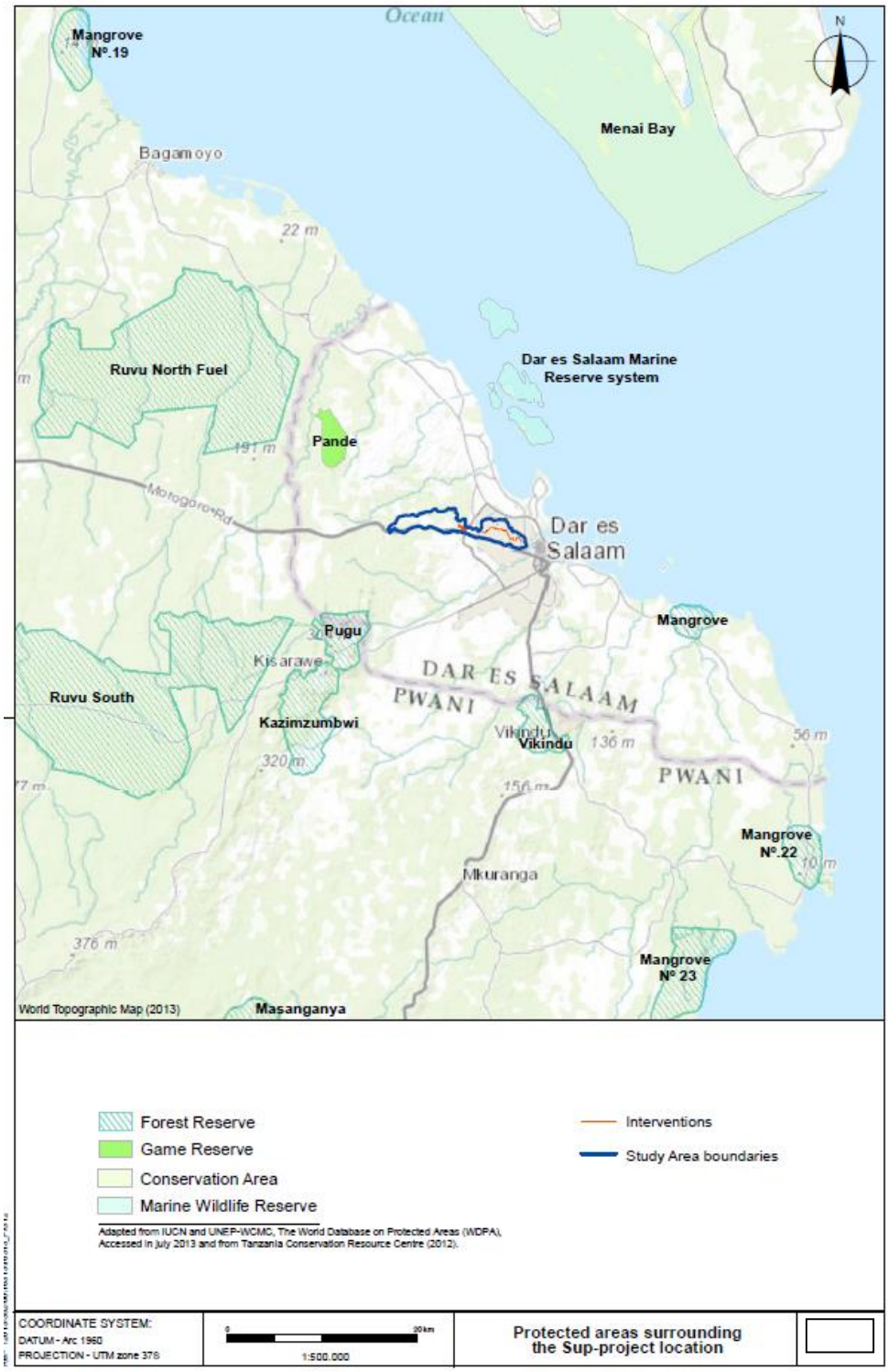
Of the ten strictly endemic bird species, four are restricted to the island of Pemba (*Treron pembaensis, Nectarinia pembae, Zosterops vaughani* and *Otus pembaensis*), one in the lower Tana River (*Cisticola restrictus*, DD), and the rest mainly in the mainland coastal forest remnants (*Erythrocercus holochlorus, Anthus sokokensis* (EN), *Ploceus golandi* (EN), and *Campethera mombassica*). The remaining strict endemic is found in coastal grasslands in Kenya, *Anthus melindae*. The most restricted species on the mainland is Clarke's weaver (*Ploceus golandi*), which is known only from Arabuko-Sokoke and one adjacent forest in coastal Kenya. Somewhat more wide-ranging species found in these forests include the Sokoke Scops Owl (*Otus ireneae*, EN),

Fischer's turaco (*Tauraco fischeri*), plain-backed sunbird (*Anthreptus pallidigaster*, EN), spotted ground-thrush (*Zoothera guttata*, EN), east coast akalat (*Sheppardia gunningi*, VU) and the southern-banded snake eagle (*Circaetus fasciolatus*).

At least 158 species of mammals use this ecoregion, approximately 17% of the total species in the Afrotropical realm. The most diverse mammal groups are bats (58 species), rodents (27+ species), carnivores (19 species), primates (14 species), and shrews (14 species).

Of the 94 reptile species occurring in the ecoregin, 47 are forest-dependent and 34 are strictly endemic. Key endemic reptile groups include geckos (*Gekkonidae*), chameleons (*Chameleonidae*), skinks (*Scincidae*), lacertid lizards (*Lacertidae*), worm-snakes (*Typhlopidae*), and true snakes (*Atractaspididae*, *Elapidae*, and *Colubridae*). The amphibians in this ecoregion are also diverse and exhibit a moderate rate of endemism. Poynton list 14 species as largely confined to coastal forests, with 2 species being strictly endemic to this ecoregion (*Afrixalus sylvaticus* and *Stephopaedes* sp. nov).

Millipedes, mollusks, and butterflies also exhibit high diversity and moderate levels of endemism. There are 1,200 species of mollusks in the region, 125 of which are confined to forests. Of the regional total, 207 species are endemic, of which 86 species confined to forests. Butterflies are represented by 400 forest species, of which 75 are endemic.



(Adapted from The World Database of Protected Areas, PROCESL/COWI, 2014)

FIGURE 14

PROTECTED AREAS SURROUNDING THE SUB-PROJECT LOCATION

4.3 FINANCIAL AND ECONOMIC BASELINE CHARACTERISTICS

4.3.1 Agriculture

Only 3% of the working force is engaged in subsistence agriculture in the peri-urban areas of the municipality. Most farm plots range from few meters to several acres. Around home yards, crops grown include tomatoes, citrus fruits, pineapple, pawpaw, vegetables etc. Larger farms grow crops like cassava, sweet potatoes, cashew nut, coconuts etc. Such crops are grown for domestic consumption and commercial purposes. Urban agriculture is not regarded as an important economic activity in most urban areas of the country but Kinondoni Municipal Council has a large potential track of land which could be used to grow a variety of agricultural produce. The municipality has about 11 050 ha of land potential for agricultural crop production. Currently, land estimated for agriculture production (both food and cash crops) accounts for 2335 ha, which is approximately 7.5% of potential agricultural land within Kinondoni Municipality. Most farmers are engaged in small and medium scale farming using hand hoes and in some cases "Power tillers" an equivalent small tiller tractor. Agriculture provides the municipality with 6 054,72 tons of food crops, which is about 4.1% of the total annual food requirement of the municipal population.

4.3.2 Beekeeping

Beekeeping is potentially practiced in some parts of municipality, e.g. in Kawe, Kibamba and Goba. There are about 510 beehives within the municipality among which 100 are modern box hives and 410 are traditional beehives that produce honey and wax. Honey is generally traded and consumed domestically within Dar es Salaam region.

4.3.3 Livestock keeping

Livestock in the Municipality contributes 34% of requirements. Actors engaging in livestock keeping include individuals, groups and institutions. Market for the livestock products are within the Municipality and Dar City at large. The Municipality and private sectors play a greater role in the supply of pesticides and livestock extension services.

TABLE 13

ESTIMATED LIVESTOCK POPULATION IN KINONDONI MUNICIPALITY

Year	2004	2005	2006	2007	2008	2009/2010
Diary cattle	18,500	18,500	20,350	21,350	20,350	20,350
Goat	8,958	8,958	9,672	9,805	9,856	9,856
Sheep	1,957	1,957	2,163	2,305	2,153	2,153
Donkey	24	24	18	23	26	26
Pigs	5,730	5,730	6,353	7,560	6,375	6,375
Broilers	1,854,960	1,854,960	1,854,960	2,240,000	1,854,960	2,225,952
Layers	266,076	266,076	319,290	435,600	319,292	393,150

4.3.4 Fish and fisheries

Fishing is one among major economic activity which is practiced within the municipality. Fishing is commonly practiced along the coastal areas of Mbweni, Kunduchi and Msasani. By the year 2011 the municipality had six fish receiving stations 1 393 registered fishermen, 373 fishing vessels and 1 901 fishing gears. Fishing in the municipality is for both subsistence and commercial purposes.

Kinondoni Municipality has three fish-markets located at Msasani, Kunduchi and Ununio. However, illegal fishing is extensively and secretly practiced along coastal areas of Dar es Salaam and in some neighbouring fishing villages. Blasting and dynamite fishing are among major illegal practices which have caused significant environmental degradation including destruction of marine ecology and habitats.

4.3.5 Tourism

The municipality has developed gardens at Malolo, and Mburahati areas. These gardens, together with individual growers, are centers for agro-extension services and vegetables, tree seedlings and flowers selling to the community. However, the municipality has good and attracting beaches and hotels potential for investment attraction. Potential beach areas include Oysterbay, Msasani, Kawe, Mbezi, Jangwani, Kunduchi, Ndege and Mbweni beaches which have potential for recreation and tourism. Beach hotels include Bahari Beach Hotels, Rungwe Oceanic, Silver Sand, Kunduchi Beach Hotel, Water World, Jangwani Sea Breeze, White Sands, Beach Comber, Ndege Beach Resort, Belinda Ocean Resort, Oysterbay Hotel, Slipway and Sea Cliff, among others.

4.3.6 Mining

Sand, gravel stone/boulders, aggregate, limestone and salt extraction are common mining activities practiced within Kinondoni Municipality. Materials extracted from mining sites such as sand, gravel and salt are being traded locally for construction purposes within the city of Dar es Salaam.

Mining activities are legally required to be carried out under the provisions of Mining Act of 1998, which prohibits reconnaissance, prospecting or mining without mineral rights and or without a written consent from the relevant authority. However, there are some illegal mining activities, particularly sand and gravel extraction, along the outskirts of the city.

4.4 SOCIAL SERVICES AND INFRASTRUCTURAL CHARACTERISTICS

Kinondoni Municipal has four (4) divisions namely: Magomeni, Kinondoni, Kibamba and Kawe. These divisions are then divided into twenty seven (27) Wards, which inturn are sub divided into sub wards commonly known as Mtaa (singular) or Mitaa(plural). There are 127 Mitaa. The Municipality also has 3 electoral constituencies namely: Ubungo, Kawe, and Kinondoni. The Municipal governing body is the Full Council, which comprises 48 Councillors out of whom 27 are elected Ward representatives, 10 Councillors (women special seats) and 11 are Members of Parliament. The Municipality executes its administrative duties through:

- The Municipal Council;
- Ward Development Committees under the Chairmanship of the Councillor; and
- Sub-Ward (Mitaa) Development Committees.

4.4.1 Water supply, sanitation and waste management

Water supply

Water supply and sanitation in Dar es Salaam are managed by Water and Sewerage Authority (DAWASA) and Dar es Salaam Water and Sewerage Corporation (DAWASCO) and regulated by Energy and Water Utilities Regulatory Authority (EWURA). Piped water is supplied to approximately 50-60% of the population. The current water supply comes predominantly from 2 surface water dams; upper and lower Ruvu, which cumulatively provide the city with 180 million to 260 million litres of water per day. This is supplemented by a number of boreholes across the city both public and private owned.

The main source of water for Kinondoni residents is from lower and upper Ruvu River. The water from DAWASA systems contributes with 68% of the daily water consumed being the rest contributed by shallow and deep wells which owned by both private and community organizations. It is estimated that 65% of municipal residents have direct access to clean and safe water while the 35% do not have accesses. Under the Water Sector Development Programme (WSDP) – Rural Water Supply and Sanitation Programme (RWSSP) the Council has engage M/S PNR SERVICES LTD to drill 19 bore holes in 10 sub-wards within the municipality.

As mentioned in the project description (chapter 2), in this regard refers that is not expected that the project construction will require large amounts of water, whereby water supply to the population should not be affected.

Sanitation

DAWASA has nine sewage treatment networks, 8 of which use stabilization ponds to treat water before discharging to nearby stream and rivers. The ninth covers the Central Business District (CBD) and discharges directly to the sea via a 1 km pipe. These networks serve around 10-14% of the city area [Dar es Salaam Master Plan (2012 – 2032)].

The project area is characterized not only by poor drainage but also inadequate sanitation facilities. This situation causes runoff to be mixed with excreta, which can spread pathogens around communities and increase health problems from various waterborne diseases. For example, infiltration of polluted water into low-pressure water supply systems can contaminate drinking water and can become a potential cause of gastrointestinal disorders. The poor sanitation condition makes the area become contaminated with faecal matter, hence providing ideal conditions for the eggs of parasitic worms, such as roundworm and hookworm, which can cause debilitating intestinal infections

Regarding this, the Municipal Council will be required to promote on-site sanitation through introduction of appropriate pit latrine technology in unplanned settlement in Ubungo area. The effort of KMC should be supplemented by DAWASCO, in order to introduce construction of sewerage systems and encourage local residents to be connected to the sewerage systems. The introduction of sewerage system will minimize the problem of discharging raw sewage by local residents into storm water drainage systems.

Waste management

Currently Dar es Salaam faces a great challenge regarding the municipal waste management strategy. Waste collection system in place has been proven inefficient posing environmental and health hazards to the population.

According to the Municipal Solid Waste Management Project in Dar es Salaam, in preparation for the DMDP[11], the municipal waste is collected nearby households, commercial establishments, institutions and industry by either the DLAs or private sector and taken directly to Pugu dump.

[11]Municipal Solid Waste Management in Dar es Salaam - Draft Baseline Analysis.Prepared for the World Bank. Washington, DC. October, 2012. Dar es Salaam Metropolitan Development Projects 2011, Waste Management Projects.

(Field work, PROCESL/COWI, 2014)

PHOTO 8

PUGU DUMPSITE

In some cases, where collection vehicles cannot access, waste is collected and taken to the collection sites by handcarts before being transported to Pugu waste dump.

According to the same study, there is no current waste management practice in the unplanned areas of the city. Thus, population disposes of their waste into drainage ditches, streams and by the roadside. In some cases in large amount of waste is disposed, potentially leading to disease vectors for soil, water and groundwater pollution.

Solid waste production in Dar es Salaam is estimated to be about 4,161 tons/day against an approximate collection and disposal of only 1,533 tons/day, which means that nearly 63% of the produced solid waste is improperly disposed of, usually near the urban unplanned settlements and illegal commercial spots alongside roads and watercourses.

TABLE 14 below presents the total amount of waste generation in Kinondoni Municipality and the amount collected.

TABLE 14

SOLID WASTE GENERATION IN KINONDONI MUNICIPALITY

Amount generated (tones)	Amount collected (tones)	Collection Rate(%)
2,026	823	41

(Municipal Solid Waste Management in Dar es Salaam - Draft Baseline Analysis. Prepared for the World Bank. Washington, DC. October, 2012. Dar es Salaam Metropolitan Development Projects 2011, Waste Management Projects)

It is clear that improper waste disposal, together with the insufficient storm water drainage infrastructures and the unplanned urban development, should be considered one of the major contributors to flooding events within the City of Dar es Salaam. Considerable amounts of waste scattered along the existing drains and water courses normally blocks the storm water natural flow routes.

The dumping of solid waste into the storm water drainage infrastructure is a practice widely spread all over the study area, especially through the informal settlements where the absence of wide roads makes access for collection difficult. In some regularly flooded areas the population uses the compacted solid waste as a protection barrier to deviate water flow from their houses/properties. With the rehabilitation of storm water drainage at Sinza River it is expected the involvement of KMC to conduct periodic cleaning of open drainage channels with the participation of the local residents. The Municipal Council will also be required to enforce its by-laws to discourage people from throwing solid wastes and discharging raw sewage into the open drainage channels.

These activities will increase the aesthetic value of the surrounding environment due to improved solid waste collection.

4.4.2 Energy

Kinondoni Municipality, like other settlements in Tanzania depends on different sources of energy, such as electricity, kerosene, charcoal, firewood, solar, etc.

The main source of power for lightning, business and industry is electricity, which is generated, transmitted and supplied by Tanzania Electricity Supply Company Limited (TANESCO), although the main source of energy is biomass due to its use for cooking. TNESCO's generating system mainly consists of hydro and Thermal based plant.

The general age of the electricity infrastructure is old and is another cause of the frequent black and brown outs that occur. There is a significant distribution loss of 26% across the network due to technical and non-technical causes.

There are two gas fired power stations in Dar es Salaam plus independent supply. SONGAS are also supplying gas to TANESCO for power production.

Concerning energy used for cooking and lighting houses a whole the majority of households use firewood for cooking followed by other sources of energy which are charcoal and kerosene. There are few households which use electricity and gas as a source of cooking energy because they are too expensive for ordinary households. In terms of policy implication the overdependence on firewood and charcoal as a source of energy clearly shows that there is excessive exploitation of forests and woodlands in these villages or neighbouring regions such as Pwani and Morogoro.

As far as lighting energy is concern the majority of households use electricity for house lighting only because it is very expensive when used for cooking. The second source of energy for lighting is kerosene which if it is combined with kibatali (wick lamp) it emerges to be the major source of energy for lighting. The other source of energy is solar which is used by few affluent people because the current installation cost is very expensive. There are few households which use other sources of energy for lighting such as biogas and firewood.

4.4.3 Transport and telecommunication

Kinondoni Municipality has a total length of 1010,36 kilometres of roads, out of which 197,55 km are served by TANROADS (road agency under the Ministry of Works) and the rest812,81 km are served by Kinondoni Municipal Council. Out of 812,81 km served by the council, only 178,8 km are tarmac roads, 478,60 km gravel roads and the rest 155,4 km are earth origin. **TABLE 15** below provides a general overview of road conditions within the municipality.

TABLE 15

THE STATUS OF ROAD NETWORK WITHIN KINONDONI MUNICIPALITY

Road Condition	Tarmac Roads	Gravel Roads	Earth Roads
Good	156,5	75,5	6,2
Fair	1,6	195,4	82,4
Poor	20,7	207,7	66,8

The Council conducts periodic rehabilitation, maintenance and upgrading of roads and bridges in order to improve the road network within the municipality specifically, by focusing on routes which can significantly reduce the overloaded traffic congestion along major roads. Funding for these activities originate from the "Road Funds Board" and partly from other government sources.

Kinondoni Municipal Council has four Mini Bus Terminals namely; Ubungo daladala terminal, Mbezi bus station, Mwenge daladala terminal, and Tegeta daladala terminal. Also Ubungo Bus

terminal for Buses destined upcounty is found in the municipality. There are 96 Taxi stands in the municipality.

Regarding communications, the Tanzania Communications Commission was established under the Tanzania Communication Act no. 18 of 1993 and became operational in 1994. The commission is charged with the responsibility of regulating the activities of the service providers in the postal and telecommunication sub-sectors. The city of Dar es Salaam has 5 fixed lines and 10 mobile phone subscribers per 100 people.

4.4.4 Health Services

The model of health services delivered by the Kinondoni Municipality is like any other districts in Tanzania based on preventive, promoted and curative care. The line of operation starts from the dispensary, health centre to the Municipal hospital. The mission of the municipal council is to ensure that health beneficiaries are provided with affordable and quality health services while enhancing preventive health services at community level. Currently, the council has a total of 304 health facilities of which, 87 are government owned and the remaining 217 privately, parastatal or religion based organizations as shown in **TABLE 16** below.

TABLE 16

TYPES OF HEALTH SERVICES AVAILABLE WITHIN KINONDONI MUNICIPALITY

Health Facility	Government	Parasternal	Private	Religion	Total
Hospital	2	2	19	2	25
Health Centers	2	1	10	1	14
Dispensaries	40	2	118	3	163
Reproductive & Child Health	43	4	47	8	102

HEALTH CENTRES WITHIN THE PROJECT AREA

Municipal	Ward	Schools		Health services	
		Primary	Secondary	Private	Public
Kinondoni	Ubungo	5	0	0	1 Dispensary
	Sinza	7	3	1 Health Centre 6 Dispensaries 1 Laboratory	1 Hospital
	Tandale	3	0	0	1 Dispensary
	Manzese	4	1	1 Dispensary	0
	Magomeni	3	0	0	2 Dispensary
	Ndugumbi	3	1	TBD	TBD
	Mwananyamala	5	2	4 Dispensaries	1 Hospital
	Makumbusho	6	1	0	0
	Kijitonyama	2	1	2 Hospitals	2 Dispensary
	Hananasif	2	1	2 Clinics	1 Dispensary

HIV/AIDS PREVENTION STRATEGY

The Kinondoni Municipal Council is implementing HIV /AIDS prevention programmes under the guidance of the National Policy on HIV/AIDS (2001) and the National Multi-sectorial Strategic Framework (NMSF) of 2008/2012 focused on four key important areas including:

- Care and Treatment;
- Prevention;
- Conducive environment and;
- Proper mitigation.

HIV and AIDS interventions within the Council are coordinated by multi-sectoral Aids Committees which include Council Multi-sectoral Aids Committees (CMACs), Ward Multi-sectoral Aids Committees (WMACs) and the Mtaa Multi-Sectoral Aids Committees (MMACs).

The HIV/AIDS services are provided by both public and private health facility providers. Such services include: Voluntary Counselling and Testing (VCT); treatment for AIDs patient with Antiretroviral (ARV); Provider Initiating Testing and Counselling (PITC);Prevention of Mother-to-Child Transmission (PMTCT);Tuberculosis (TB) and Human Immunodeficiency Virus (HIV) Services; Sexual Transmitted Infection (STI); Home Based Care (HBC); support to orphans; people living with HIV/AIDS; and other vulnerable groups. In a more comprehensive approach, HIV/AIDS programmes country wise are operated under the umbrella of the main principal agency-Tanzania Commission for AIDS (TACAIDS).

4.5 SOCIO-CULTURAL BASELINE CHARACTERISTICS

4.5.1 Ethnic composition and demography

The population of Kinondoni Municipality is 1 358 004 with an average growth rate of 4.1 percent.

The indigenous inhabitants were Zaramo and Ndengereko, but urbanization of the district has transformed it into a multi-ethnic one.

DEMOGRAPHIC PROFILE OF PROJECT AREA

The total population of the sub-project area is estimated at 499,173.

TABLE 17

POPULATION

Municipal	Ward	Population	
		Male	Female
Kinondoni	Ubungo	27,221	28,796
	Sinza	18,892	21,654
	Tandale	27,205	27,256
	Manzese	34,495	36,012
	Magomeni	13,126	13,775
	Ndugumbi	17,894	18,947
	Mwananyamala	24,322	26,238
	Makumbusho	33,251	34,842
	Kijitonyama	27,509	30,623
	Hananasif	17,978	19,137
	TOTAL	**241,893**	**257,280**

4.5.2 Settlements

The low density housing area in Kinondoni Municipality is located at Oyster Bay-Masaki, Ada Estate and Regent Estate. The medium densities areas are Kijitonyema, Mbezi, Mikocheni, Mbweni, Tegeta with plot sizes of 801-1600 sqm. High density areas are situated at Sinza A-F, Mwananyamala, Magomeni, Kinondoni, Bunju, with plot sizes between 400-800 sqms.

The mixed densities (high and medium) are located at Mbweni and Bunju. The history of Magomeni and Sinza dates back to Swahili settlements, with Swahili type houses, before the 1970s. After the 1970s, 'the site and services project' planned Sinza for the low income earners. According to the preliminary draf of Dar es Salaam Master Plan 2012-2032 this category of people were unable to afford the houses, instead they chose to sell them off. The developers demolished the original housing to construct new modern ones that covered the plot to maximum.

URBAN DEVELOPMENT STATUS

Due to uncoordinated development, the municipality is extremely poorly served in terms of planning, particularly in unplanned areas, old centers and new planned residential areas. As a result, the quality and quantity of utility services provided in these areas do not meet the standards demand. The infrastructure provision is inadequate, uncoordinated and lags behind the pace of development activities. Urban expansion has continued to take place regardless the municipality efforts to provide better infrastructures and improve facilities in some areas. The rate of urban growth and population increase has outpaced the local authority's capacity to provide the required services. Thus, new approach and carefully planning are needed for the future proper plan/growth of the city.

4.5.3 Employment Status within Municipality

It is estimated that 841 551 residents of Kinondoni Municipality are engaged in private, public and self-employment. 513346 (61%) are employed in the private sector, 300434 (36%) are self-employed while the rest 27771 (3%) are employed in the public sector. The majority of the residents are street vendors, office workers, professionals, shopkeepers, craftsmen, fishermen, small scale farmers, security guards and social services providers, e.g. nurses, teachers, livestock keepers, farmers, etc.

4.5.4 Cultural heritage

Cultural heritage represents the identity of a community and its environment. Cultural heritage can include monuments or other buildings that represent important events or eras in local or national history, traditional lifestyles, such as the performing arts and handicrafts, and even the everyday activities of local people as they farm, fish or prepare food.

Tanzania, as other countries in the world, is legally protecting cultural heritage. The legal protection of the country's tangible cultural heritage is affected through the Antiquities Act of 1964 (Act No. 10 of 1964 Ca.550) that is principal legislation and the Antiquities (Amendment) Act, 1979 (Act No. 22 of 1979). The 1964 Act repealed the Monuments Preservation Ordinance of 1937 and 1949 and enlarged the scope of the heritage, which needed to be conserved. The legislation offers general protection to objects or structures, which are of archaeological, palaeontological, historic, architectural, artistic, ethnological or scientific interest.

The built environment of Dar es Salaam City today, is a product of four main administrative periods: the Arab Period (1860-1890), the German Period (1890-1916), the British Period (1916-1960) and the Post Independent Period (1960-today).

Kinondoni Municipality has some important cultural landmarks in the city including Mwenge Artcraft Market, Makumbusho Cultural Centre, Karibu Arts Gallery, located at Mbezi Beach, etc. Most of these centers are famous for collection of different types of art crafts such as traditional swahili clothing, accessories, cultural paintings, food, traditional dances, etc. Moreover, Kinondoni Municipal Cultural Office has five important divisions namely, Arts, Youth, Game and Sports, Antiquities and Arches.

4.5.5 Land tenure systems

Three different types of land tenure systems exist in the project area based on individual right of occupancy as follow;

Successive Inheritance. This type of land tenure is acquired through inheritance from close family member e.g. from the father to the son. Traditionally, in many parts of Tanzania, land inheritance is strictly for male siblings and not for females. However, in recent years the government of Tanzania has tried to advocate for land tenure reforms in the country to include women to the heir family land from their respective families.

Land lease: This is another type of land tenure in the project area where land is leased for small scale crop cultivation such as fruits and vegetables. This type of lease is particularly notable along the Sinza River. Vegetables grown such as *Mchicha"* are sold commercially in local markets places where fruits are consumed domestically.

Land Purchase: This is the most common type of land tenure along the project areas. The land plot is sold to any interested potential buyer for economic development such as house construction, business premises, storage area etc. In land purchasing agreement, local government authority is liable to attest and document the transaction of sale for future reference.

4.5.6 Affected assets

The project will affect the following compensable assets:

- Land: 355 residential, 8 commercial, 4 institutional and 5 used for urban agriculture;
- Structures: 114 residential structures are partially affected, 103 residential structures are fully affected, 1small retail structure, and 21 urban agriculture areas will be affected.
- Annexed structures include: 120 toilets, 40 chambers/septic tanks, 30 fences/walls, 2 boreholes, 13 foundations or verandas.
- Crops: 852 seasonal crops, 2242 permanent crops and 538 shade/indigenous trees.
- Public facilities: 4 electrical poles, 1 water pipe and 10 footbridges

CHAPTER 5.0: STAKEHOLDER IDENTIFICATION AND METHODS OF PARTICIPATION

5.1 INTRODUCTION

Stakeholder consultations are an important element in the process of impact assessment in order to gather the necessary information for completion of the study. Consultations aimed at providing issues that are likely to be of interest to the communities, client, concerned stakeholders and developer.

This process provides an opportunity for all interested and affected parties to air their views and opinions with regard to project operation and to disseminate information within the respective project areas.

5.2 SPECIFIC OBJECTIVES OF STAKEHOLDERS INVOLVEMENT

Specific objectives of stakeholders' involvement in this project are as follows:

i. To identify major stakeholders of the project;
ii. To gather opinions and concerns of all major stakeholders involved in the project;
iii. To identify potential environmental and social impacts of the project;
iv. To identify the physical extent and boundaries of the project;
v. To integrate views and opinions of stakeholders to the design process;
vi. To inform surrounding communities objectives of the project;
vii. To provide the design team expert opinion on the main issues and problems which are necessary during project implementations;
viii. To disseminate information to the main government institutions which provide services in the area such as DAWASCO, TANESCO and DAWASA;
ix. To collect relevant information related to the project area.

5.3 ADOPTED METHODOLOGY

5.3.1 Stakeholder Identification

The primary aim of stakeholder identification is to name individuals or groups which in one way or another can be affected by the project or have a stake in it. In consideration of this process the following stakeholders were identify;

- Ministry of Works
- Ministry of Water
- Ministry of Lands and Human Settlement Development

- Dar es salaam regional Commissioner Office
- Kinondoni Municipal Council
- Local People
- Local Leaders
- Business Vendors
- NGOs & CBOs
- Religion Organization
- Peer Groups
- Political Parties
- Micro Finance Organization
- DMDP
- TANESCO
- DAWASCO
- DAWASA
- The World Bank

5.3.2 Stakeholder Analysis

Stakeholder analysis is a process of systematically gathering and analysing qualitative information to determine whose interests should be taken into account when developing and/or implementing a project. Stakeholders' analysis helps to determine who the key actors of the project and who are less involved but have interest in the project. The below table shows type, level and functions of each stakeholder in relation to the project.

TABLE 18
TYPE AND FUNCTIONS OF STAKEHOLDERS

S/N	Level	Stakeholder's Name	Major Functions	Key Stakeholder	Minor Stakeholder	Consulted	Comments/ Description
1	National	Ministry of Works	Policies formulation, plans and strategies Upgrading and Management of the Construction Sector Rehabilitation and Maintenance of Roads, Ferries, Bridges, and Government Buildings		✓	not consulted	The primary objective of this project is to upgrading major surface drainage channels and not related infrastructure such as roads, bridges, ferries etc.
		Ministry of Water	Overseer of all fresh water supply to rural and urban region. Entrusted with the responsibility of developing and managing water resources of the country. Formulate and regulate policies, plans, strategies and agencies related to water supply	✓	✓	Consulted	Ministry of water is the sole stakeholder in any water development scheme
		Ministry of Lands , Housing and Human Development Settlements	Formulation of policies and strategies for development of land; preparation of land use plans; manage planning of towns and villages; preparation of maps; registration of land ownership; land valuation; manage acquisition and maintenance of land records	✓		Consulted	The project involves valuation of properties and land to the affected individuals which has to be approved by the Ministry of lands
2.	Regional	Dar es salaam regional Commissioner	Among other important roles of the Regional commissioner (RC) are to ensure peace and tranquillity in the region; to facilitate and assist LGAs in the Region; to be the representative of the Central Government (CG) within the region. The RC implement the government development project through the LGAs		✓	not consulted	The RC office mostly assist administrative issues related to government projects
3.	District /	Ilala Municipal	Among other important function of	✓		Consulted	The project falls under its

S/N	Level	Stakeholder's Name	Major Functions	Key Stakeholder	Minor Stakeholder	Consulted	Comments/ Description
	Local Government Authorities	Council	Municipal councils is to Formulate coordinate and supervise the implementation of all plans for economic and social development in their areas of jurisdiction.				jurisdiction
		Kinondoni Municipal Council	Among other important function of Municipal councils is to Formulate coordinate and supervise the implementation of all plans for economic and social development in their areas of jurisdiction.	✓		Consulted	The project falls under its jurisdiction
4.	Ward & Mtaa	Local People	Community Members	✓		Consulted	Affected people; main project stakeholders
		Local Leaders	Community Members	✓		Consulted	Community leaders and affected by the project
		NGOs & CBOs	Non-Governmental Organizations	✓		Consulted	Community based organization –affected by the project
		Religion Organization	Non-Governmental Organizations		✓	not consulted	Emphasis on religion matters within communities
		Peer Groups	Community Members		✓	not consulted	Community based groups
		Micro Finance Organization	Non-Governmental Organizations		✓	not consulted	Community based groups mainly related to financial matters
5.	Government Agencies & Departments	TANESCO	Government agency entrusted by the government to provide services related to electricity generation, electricity transmission, electricity distribution and sale of electricity in the country	✓		consulted	Power supplier to the community
		DAWASCO	Responsible for supplying clean water and transport sewerage to all inhabitants of the city	✓		consulted	Water and sanitation service providers in te community
		DAWASA	Mainly provide sewerage sanitation	✓		consulted	Clean water service

S/N	Level	Stakeholder's Name	Major Functions	Key Stakeholder	Minor Stakeholder	Consulted	Comments/ Description
			services to Dar es Salaam and its satellite towns of Bagamoyo and Kibaha..				provider in the community
		DMDP	The client; Dar es salaam Metropolitan Development project	✓		consulted	Project developer / Cleint
		NEMC	National Environment Management Council – A government agency entrusted to oversee all environmental related issues	✓		consulted	Environmental Management
6.	International Organizations	The World Bank	Project financier	✓		Consulted	Project Financier

(PROCESL/COWI, 2014)

5.3.3 Stakeholder Consultation Process

Consultation process started with the identification of major stakeholders of the project who had interest in the project and who were directly or indirectly involved. Most stakeholders identified were those who used utility services such as water supply, sanitation and electricity. Other stakeholders identified included regulatory authorities, municipal authorities and local people of respective jurisdictions. Most stakeholders were identified during early environmental scoping stage while investigating the main environmental and social issues of concern. Stakeholders were also identified through discussion and interviews with other stakeholders who thoroughly identified roles and responsibilities of different government organs, institutions and groups. Expert opinion was also used to identify major stakeholders of the project.

Consultations

Phase I

Preliminary consultations involved major institutions and local government leaders in order to obtain basic information related to project area and public institutions. During preliminary stage of this Project, several stakeholders were consulted, not only to obtain the literature, references, maps and other documents necessary for the project development but also to introduce the Project and obtain their views regarding it. These visits started on February 13th 2013 and included the following stakeholders and representatives:

TABLE 19

STAKEHOLDERS CONSULTATION IN FEBRUARY 2013

Institution	Name
Kinondoni Municipal Council	Eng. Francis Mogishe
National Environmental Management Council	Eng. Ignace A. J. Mchallo – Director of Environmental Impact Assessment Department
Ministry of Lands, Housing and Human Settings Development	Eng. Linus Shao – Physical Planning Division Settlement Regularization Section
DAWASA – Dar e Salaam Water and Sewage Authority	Engineer responsibly for the sewage

(PROCESL/COWI, 2014)

Phase I Consultation Results

The collected information and visits included the following:

- Background information about the existing drainage system, mapped, written and/or drawn;
- History about periodic reported severe flooding;

- Studies, designs and specific available reports about the drainage systems;
- Cartographic / topographical available information;
- Visits to the sites already identified as the most critical and vulnerable ones;
- Analysis, review and establishment of the design criteria to adopt in the next stages of the work.

Phase II

The second consultations were conducted from 24th to 27th June 2013 under the "World Bank Review Mission for the Dar es Salaam Metropolitan Development Project Preparation". This meeting aimed to present the DMDP, including the Drainage Plan and Pre-Feasibility Study, and to discuss it together with the stakeholders involved. Attended to this meeting, besides PMO-RALG and World Bank, representatives from the ministries and the three municipalities involved. Following this meeting, it was clear that stakeholders involved were concerned about the occupation of the detention pond areas.

Phase II Consultation Results

- Mrs Faeda Magesa (Environmental Management Office from Kinondoni Municipality) suggested that it was important to contact the Municipal Council Directors from all three municipalities involved to arrange site visits together with the municipal technicians in order to identify major impacts on agricultural areas which were being developed. This site visit occurred on June 29th 2013. Additionally, the representative of Ministry of Lands, Housing and Human Settlements Development, recommended the design to always use the natural streams, underlining the importance of the social component in the selections of the priority Sub-projects.
- There was another meeting conducted together with the Basin Authority – Wami/Ruvu River Basin Office (at the Water Ministry), with Mr Mshuda Wilson and Mr Peter Bibyarugaba where the key project issues and the proposed interventions were presented. The main concerns raised by the Basin Authority were the importance of the aquifers recharge in the proposed solutions for interventions leading to soil impermeabilization. It was also suggested to construction retention ponds in non-polluted areas instead of detention ponds, which would promote the aquifers recharge.

Phase III

Phase III of consultations involved government utility agencies and departments which cater utility services in project areas which include TANESCO, DAWASCO, DAWASA, OSHA and the Ministry of Land, Housing and Human Settlement Development (MLHHSD). These consultations were conducted during October 2013 and involved meetings, discussions and interviews with local government officials from Kinondoni Municipal Council, DAWASCO, DAWASA and TANESCO as shown in the table below.

TABLE 20
CONSULTED GOVERNMENT INSTITUTIONS AND UTILITY AGENCIES

Name	Stakeholder Institution	Jurisdiction Area	Consulted	
			Scoping Stage	Detailed EIA
Ainea Kimaro	DAWASCO	Kinondoni	✓	
Mathias Mlagambwa	DAWASA	Kinondoni	✓	
Mrs. Komba	Municipal Council	Kinondoni	✓	
Eng. Gasper Msigwa	TANESCO	Kinondoni	✓	
	Ministry of Lands Housing and Human Settlement Development	Throughout the Country		✓
	Occupation Health and Safety (OSHA)	Throughout the Country		✓

(PROCESL/COWI, 2014)

Phase III Consultation Results

TABLE 21

MAJOR ISSUES RAISED BY TANESCO

Issue Raised
Consultation with TANESCO Regional Manager - Kinondoni South was conducted on October 15th 2013. The main issues of concern reiterated by the TANESCO regional manager were as follow: 1. TANESCO Regional Offices Set-up The manager started by explaining that in order to expedite better services to customer, Dar es Salaam TANESCO offices are divided into regions. For Kinondoni district the offices are divided into North and South region, respectively. Dar es Salaam city is classified as "class A" region characterized by a number of customers and revenue accrued. For this project, the manager explained that both TANESCO region offices will be involved to provide services since the project area extends towards the northern and southern jurisdiction respectively. 2. Problems and challenges Most unplanned settlements have limited spaces for construction of roads and installation/placement of electrical infrastructure facilities. Vandalisms, theft and sabotage According to the manager, many areas of unplanned settlements experience serious problems related to vandalism, theft and sabotage of infrastructure facilities particularly for materials made up of copper and metals such as electrical cables. Costs of Moving /Relocated Infrastructure Facilities The company has limited funds to relocate infrastructure facilities, e.g. electrical poles and transformers, especially for big infrastructure projects. Moreover, some people are reluctant to provide land space for installation of facilities such as pathways, water pipes or transformers. This reluctance complicates the process of providing power supply to some individuals located in such areas. It should be noted that the customer is liable to bear connection costs to the main power supply. Limited Capacity of Power Supply Most power supply systems in Dar es Salaam were built many years ago when the population was relatively small in the city. Currently, electrical power consumption is very high due to the growth and expansion of the city and other economic activities in Dar es Salaam. Thus, supplying electricity into unplanned settlements needs establishing new connections and power lines into these neighbourhoods. 3. Measures Taken to Provide Reliable Services Education TANESCO is vigorously conducting education campaigns in many areas where there are problems related to vandalism, theft and sabotage of electrical infrastructure facilities. Local leaders have been involved to spearhead education campaigns within their areas of jurisdictions by explaining to community members the importance of protecting and proper use of infrastructure facilities including power meters, transformers and electrical cables. Compensation Whenever individual land space is annexed for expansion or installation of electrical facilities, TANESCO pays dully compensation to the affected individual as prescribed by the laws of Tanzania related to relocation and resettlement. Limiting /Avoiding Vandalism To limit / avoid sabotage and vandalism many transformers have been moved from open public space areas to front yards of individual community members. Alternative Material Usage TANESCO has tried to apply alternative materials to substitute copper and metal materials whenever possible. There have been many cases where copper and metal infrastructure products have been stolen and sold as scraper to authorised dealers.

(PROCESL/COWI, 2014)

TABLE 22

MAJOR ISSUES RAISED BY DAWASCO KINONDONI

Issue Raised
Consultation with DAWASCO Kinondoni regional manager was conducted on October 15th 2013. The main issues raised were as follows: <u>Water Leaks from main water supply pipes</u> According to the manager, water leaks from main water supply pipes in many unplanned settlements are common problems experienced by many customers. However, he mentioned that many water leaks are caused by either corrosion, limited services or improper connection by some individuals. <u>Increasing water demand</u> Water availability in many unplanned settlements is limited due to growth of population over time especially in Dar es Salaam. Water infrastructure facilities have been slowly upgraded to meet the ever increasingly growing demands for water supply for Dar es Salaam residents with many challenges. Up to date very few areas in the city get sufficient quantities of water supply on daily basis. <u>Corporation with other utility agencies</u> Timely execution of civil works with other utility agencies such as TANESCO, TANROASDS (Roads agency) and municipal council is difficult to be implemented since each agency has its own budget, work plan and goals for specific period of time. Thus, simultaneously execution of works related to water supply, electrical power supply and sewerage will be complex and difficult to implement. <u>Billing and service follow-up</u> It is difficult to follow up repairing works and water bills in unplanned settlements since DAWASA uses maps to identify problem areas for repairing and other civil works. In many unplanned settlements residential areas are not officially mapped for services. Other Challenges facing the agency includes: <u>Infrastructure vandalism</u> According to DAWASCO manager, many water supply pipes are being detached from water meters to distort readings of actual amount of water used per month period. <u>Unpaid bills</u> Unpaid bills leads to weaker financial position of the agency and hence poor services and maintenances. <u>Illegal connection</u> Many areas are characterized by illegal water connections which is common phenomenon in many parts of the city.

(PROCESL/COWI, 2014)

TABLE 23

MAJOR ISSUES RAISED BY DAWASA

Issue Raised
Consultation with DAWASA engineer Mathias Mlagwanda was conducted on October 15th 2013 at DAWASA Kisutu offices. The main issues discussed include the following: Mode of operation (Modi Operandi) Dawasa strictly operates for sewerage services in the city of Dar es Salaam. DAWASA does not have legal mandate to instruct users on how to handle waste /sewerage from household but rather the agency provides services for those who are willing to pay for. Most of DAWASA infrastructure facilities are found underground. Few/limited infrastructure facilities DAWASA has fewer infrastructure facilities since many parts of the city do not have central sewerage systems for sewerage waste. The only area which has extensive and planned underground sewerage central system is Kariakoo area. Sewerage blockade One of the main problems facing DAWASA is the shortage water to facilitate draining of sewerage leading to blockade of sewerage in many parts of Dar es Salaam. Vandalism of facilities Like water and power supply facilities, DAWASA is faced with sabotaged and vandalism of its infrastructure facilities particularly storm water covers which are located in public places. Most covers are stolen and sold to authorized metal scraper vendors who will then sell to recycle centres where the materials are melt and moulded into different products. Sewerage overflow and bad odour In many parts of the city, sewerage systems do not function properly as a result of sewerage overflow can be observed in many parts of the city and in unplanned settlements as well. The role of DAWASA is to collect and transport sewerage on contractual basis from households which subscribe to the services. Measures taken DAWASA has started vigorous campaign trying to educate people on the effects of health and safety to the community caused by vandalism of sewerage infrastructure facilities especially storm water covers. Awareness education campaign is planned to be aired by Radio Clouds on weekly basis. Other measures include legal procedure such as legal action and fine according to the laws of the country.

(PROCESL/COWI, 2014)

TABLE 24

MAJOR ISSUES RAISED BY MUNICIPAL ENGINEER

Issue Raised
Consultation with Municipal Engineer was conducted on 16th Oct 2013. The main issues of concern discussed were as follows: Limited land space to develop infrastructure in unplanned settlements Municipal engineer argued that there are limited land spaces to develop infrastructure facilities in unplanned settlements of the city such as roads, sewerage, electrical poles etc. Thus, it is difficult to provide services such as waste collection in such areas. Enhance waste collection points Since there are fewer wide roads in many unplanned settlements it was argued that the local community should enhance waste collection points in areas where trucks can easily be accessed. The need for spatial planning According to municipal engineer, whenever possible, the government should acquire land from land owners in unplanned settlements and zone accordingly. The government must prohibit unregulated construction of houses and other infrastructure in such areas. This is important because the compensation costs for land are increasingly becoming expensive over the years. Health and safety Strictly rules and local government by-laws related to health, safety and waste management must be enforced and followed up to ensure health and safety of people in unplanned settlements. The government must provide new land plots to discourage people to congest in the same locality thus, reduce health and safety risks in such locality. Land and property compensation To avoid high costs of compensation, local roads must be aligned in areas where there are fewer residential houses. Local community leaders must work together with local government authority to ensure residents do not encroach open spaces and

Issue Raised
other public lands.
Public participation Municipal engineer stressed public participation in large scale project involving local people residing in unplanned settlements. Due to the nature of such settlements vandalisms, theft and sabotage activities have been experienced in many projects. Experience has shown that once local people are engaged from the beginning they develop a sense of project ownership which is essential for future project sustainability. Institutional coordination Institutional coordination between different utility agencies is essential during project implementation such as DAWASCO, DAWASA and TANESCO. Coordination will help to reduce inconveniences to local residents especially during construction period such as digging trenches for water supply pipes and road construction on the same locality. Education campaign According to municipal engineer it is important to educate people on the objectives and goals of a project before execution. Education campaigns will help local people to understand why and how the project will be implemented and for whose benefit.

(PROCESL/COWI, 2014)

Phase IV: Wards and Mtaa Consultations

Consultations with Ward and Mtaa were conducted between 10th and 13th April 2014 consisting of consultant, local government leaders (WEOs) and local people of respective wards. The aim was to obtain views and opinion regarding the project. The list of stakeholders involved is provided in the table below. The comprehensive list of local people consulted is attached in the appendix.

TABLE 25

WARDS AND MTAA CONSULTATIONS

Name	Jurisdiction Area	Institution	Position
Saida Saleh	Ndugumbi Ward	Kinondoni MC	WEO
John I. Njunde	Kijitonyama Ward	Kinondoni MC	WEO
Osiligi Ole Losai	Tandale Ward	Kinondoni MC	WEO
Husna Nondo	Makumbusho Ward	Kinondoni MC	WEO
Ngaya O. Swai	Magomeni Ward	Kinondoni MC	WEO
Elizabeth Minga	Hananasif Ward	Kinondoni MC	WEO
Shaban Kambi	Ubungo Ward	Kinondoni MC	WEO
Flora Y. Mazengo	Mwananyamala Ward	Kinondoni MC	WEO
Phoibe Ileta	Sinza Ward	Kinondoni MC	
Agnes Morio	Manzese Ward	Kinondoni MC	WEO
Local People	Communities Ward	Kinondoni MC	Respective Wards & Mitaas

WEO = Ward Executive Officer

(PROCESL/COWI, 2014)

Phase IV: Results of Public Consultations

Some major issues raised during the discussion were as follow;

- What will be the fate of residents whose properties were demolished during the first phase of DMDP? The Valuer from COWI explained that he does not have a straight answer but there will be communication with Kinondoni Municipal Council which has all the information. The Valuer also indicated that this should not hinder progress since the World Bank has its own procedures in financing development projects including a timeline before funds are released.
- What will be the fate of PAPs before the project is implemented? The Valuer from COWI indicated that before the project is implemented all individuals losing their properties and assets will be compensated. He assured the residents that there will be a close cooperation between the valuation team, residents and their local governments.
- What will be the timetable for the implementation of the project? The Valuer from COWI pointed out that the project is on a feasibility stage. At this stage, the exercise is looking at the cost of the project including the compensation cost. He does not possess information on when the project will start.
- What will be the fate of those whose properties have been damaged or destroyed by floods before the valuation exercise? The Valuer from COWI indicated that wisdom and Valuer's best judgement shall be used in valuing the lost properties.
- Are those who are 30m from the drainage channel lose their properties/assets now or sometime in the future? The Valuer from COWI indicated that those who have properties or assets 30m from the drainage channel will not be affected. Those who are going to be affected are the ones identified in the engineering design reports.
- What will be the fate of residents of Tandale kwa Mtogole whose properties are affected by Kiboko Bar River? The Kinondoni Municipal representative indicated that the problem will be address in during the improvement of Sinza River as presented in the engineering design documents.
- Where is the Tsh. 5 billion from the first phase of DMDP? The Valuer from COWI indicated that he does not have an answer to the question and that the Kinondoni Municipal Council is in a better position to provide an answer.

CHAPTER 6.0: IMPACT IDENTIFICATION AND ASSESSMENT OF ALTERNATIVES

6.1 IMPACT ASSESMENT

The approach used in the impact identification took also into account the Core Impact Area (CIA), the Immediate Impact Area (IIA) and Area of Influence (AI). The CIA is the identified drainage pathways which will be directly affected by project activities including sources of non-industrial construction material and sources of water. The immediate adjacent areas (or immediate impact areas) are those immediately outside the core impact area and are indirectly likely to be affected by the project activities. These include structure within the drainage corridor likely to be affected by resettlement. The AI is the area beyond the DIA which will be indirectly affected by the construction activities. These include sources of industrial construction materials, and centres of decision-making (e.g. Ward, District and City Council offices).

Impact analysis or evaluation followed a methodology based on the following sequential steps:

- Impact identification – listing all potential positive and negative impacts of a project, including cumulative and residual impacts;
- Impact prediction – determining the magnitude, intensity, extent or size of a particular impact or set of impacts;
- Impact evaluation – determining the significance or importance of a predicted impact i.e. why we should be concerned or worry about this significant impact.

Environmental and social impacts were identified using standard EIA methodology i.e. field observations, public consultations and reference to relevant secondary information. Expert opinion and public views also provided the basis of the analysis of the significance of the individual impacts.

Following, each potential impact was analysed by its root cause (project activity or action) that will result in an impact (change in status in the natural and social environment, be it positive or negative) on a receptor (the natural environment or community that will be impacted).

First, each potential impact was rated based on set criteria, including its Nature, Effect, Extent, Duration, Magnitude and Likelihood.

TABLE 26

IMPACT RATING TABLE

Term	Definition
Nature - Nature of the consequence of the impact of a particular environmental component. If the impact in question benefits or depreciates environmental quality	
Positive Benefit	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Negative Impact	An impact that is considered to represent an adverse change from the baseline, or introduces a new undesirable factor.
Effect - The effect of a particular project action that directly affects the environment or causes impacts which in turn have side effects that result in new environmental impact	
Direct Impact	Impacts that result from a direct interaction between a planned project activity and the receiving environment/receptors.
Indirect Impact	Impacts that result from other activities that are encouraged to happen as a consequence of the project.
Cumulative Impact	Impacts that act together with other impact, affect the same resource/receptor.
Extent – The spatial extent or the zone of influence of the impact	
On-site	Impacts limited to within the Direct Area Impact Area.
Local	Impacts that affect the Area of Influence of the Project.
Regional	Impacts that affect regionally important environmental resources or are experienced at a provincial or regional scale.
National	Impacts that affect nationally important environmental resources or affect an area that is nation-ally important/ or have macro-economic consequences.
Trans boundary / International	Impacts that extend beyond country borders or affect internationally important resources.
Duration - Defines if an impact occurs only during a certain period of time, if it occurs occasionally throughout the life span of the project or if it occurs throughout the entire lifetime of project	
Temporary	Impacts are predicted to be of short duration and intermittent / occasional.
Short-term	Impacts that are predicted to last only for the duration of mobilization/construction/operation period.
Long-term	Impacts that will continue for the life of the project, but ceases when the project stops operating.
Permanent	Impacts that cause a permanent change in the affected receptor or resource (e.g. removal or destruction of ecological habitat) that endures substantially beyond the project lifetime.
Likelihood – The likelihood that an impact will occur	
Unlikely	The impact is unlikely to occur.
Likely	The impact is likely to occur under most conditions.
Definite	The impact will occur.
Magnitude – The degree of change brought about in the environment	
Negligible	The impact on the environment is not detectable and there is no perceptible change to people's livelihood.
Low	The impact affects the environment in such a way that natural functions and processes are not affected. People/communities are able to adapt with relative ease and maintain pre-impact livelihoods.
Medium	Where the affected environment is altered but natural functions and processes continue, albeit in a modified way. People/communities are able to adapt with some difficulty and

Term	Definition
	maintain pre-impact livelihoods but only with a degree of support.
High	Where natural functions or processes are altered to the extent that it will temporarily or permanently cease. People/communities affected will not be able to adapt to changes and continue to maintain pre-impact livelihoods.

Once a rating was determined, the significance definition in **TABLE 27** was used to determine the overall significance of the impact. An impact may be negative or positive and therefore the final significance rating is colour coded as per **TABLE 28** below.

The significance of an impact is the biophysical and social importance that the impact represents, being a more subjective variable since it depends on the sensitivity of the evaluator. Defining significance includes the assessment of the above criteria to determine how severe the impact will be.

TABLE 27

SIGNIFICANCE DEFINITIONS

Significance Definitions	
Negligible significance	An impact of negligible significance is where a resource or receptor will not be affected in any way by a particular activity, or the predicted effect is deemed to be imperceptible or is indistinguishable from natural background levels.
Minor significance	An impact of minor significance is one where an effect will be experienced, but the impact magnitude is sufficiently small and well within accepted standards, and/or the receptor is of low sensitivity / value.
Moderate significance	An impact of moderate significance is one within accepted limits and standards. The emphasis for moderate impacts is on demonstrating that the impact has been reduced to a level that is As Low as Reasonably Practicable (ALARP). This does not necessarily mean that "moderate" impacts have to be reduced to "minor" impacts, but that moderate impacts are being managed effectively and efficiently.
Major significance	An impact of major significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued / sensitive resource/receptors. A goal of the EIA process is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a development. It is then the function of regulators and stakeholders to weigh such negative factors against the positive factors, such as employment, in coming to a decision on the Project.

TABLE 28

COLOUR SCALE FOR RATINGS

Negative rating	Positive Ratings
Negligible	Negligible
Minor	Minor
Moderate	Moderate
Major	Major

6.2 IMPACT IDENTIFICATION

During mobilization and construction phases the main activities which can potentially generate environmental impacts are summarized as follow:

- Material storage, transport and earthworks;
- Land clearing and earthworks;
- Movement of machinery and vehicles;
- Installation of work facilities and work camps;
- Increment on human presence and noise associated;
- Land take;
- Social interaction;
- Disruption of service utilities;
- Excavations;
- Surface water drainage system operation;
- Illegal discharges;
- Surface water drainage infrastructures maintenance;
- Surface water drainage channels clearing.

During operation phase of the project, whenever there is a need to repair or replace infrastructure facilities, mitigation measures must be considered in advance to minimize or limit the risk of impact to the environment and or to the people. Construction activities (through the use of equipment and machinery) can impact the environment such as air pollution and noise nuisance.

Below are presented the environmental and social impacts during mobilization, construction and operation phases, identified through stakeholder involvement, field work and literature review.

6.2.1 Potential impacts during mobilization phase

Positive impacts

i) Local employment opportunities;
ii) Opportunities for local traders;

Negative impacts

i) Landscape disturbance and loss of vegetation cover and habitats;
ii) Air pollution;
iii) Soil pollution;
iv) Surface water pollution;

6.2.2 Potential impacts during construction phase

Positive impacts

i) Impact on local employment opportunities;

Negative impacts

i) Ground water pollution;
ii) Landscape disturbance;
iii) Soil pollution;
iv) Noise levels increment;
v) Air pollution;
vi) Surface water pollution;
vii) Disruption of natural drainage network;
viii) Waste production;
ix) Loss of habitat, ecosystem and land use;
x) Destruction of flora and fauna disturbance;
xi) Land take;
xii) Traffic accidents;
xiii) Disruption of services;
xiv) Impacts on occupational and community health and safety;
xv) Impacts on cultural heritage;

6.2.3 Potential impacts during operation phase

Positive impacts

i) Improved storm water drainage system;
ii) Improvement of landscape visual quality;

Negative impacts

i) Ground water pollution;
ii) Soil pollution;

iii) Noise levels;
iv) Air pollution;
v) Surface water pollution;
vi) Waste production;
vii) Damages to nearby properties and infrastructures;
viii) Impact on occupational and community health and safety.

6.3 IMPACT EVALUATION

Considering the information provided in the tables above, impact analysis and evaluation focused in the each significant impact (with major and moderate significance).

In the next sections, significant impacts (positive and negative) associated with each phase of the project are evaluated.

6.3.1 Stakeholder Consultation Process

POSITIVE IMPACTS

i) Local employment opportunities

During mobilization phase the project will create jobs to casual labourers who will be employed in sections of driving, security at the site, transportation of equipment and site clean-up.

ii) Opportunities for local traders

Creation of opportunities for local/small business like from the acquisition and / or mobilization of construction equipment and machinery.

NEGATIVE IMPACTS

The main adverse impact during mobilization phase will be associated with mobilization of construction equipment and machinery, including vehicles, bulldozers, excavators, concrete vibrators, generators etc.

All impacts expected to occur during mobilization and construction phases may be considered as cumulative impacts resulting from simultaneous constructions in the study area, since it is anticipated that the project will intersect the Infrastructure Upgrading in Unplanned Settlements Sub-projects under the DMDP, in the area of Il 3 intervention ant Kigilagila.

Nevertheless the potential cumulative negative impacts caused by simultaneous constructions, can be managed with coordination of schedules at the city level, and good construction management during implementation.

i) Landscape disturbance and loss of vegetation cover and habitats

Vegetation clearance in the mobilization phase will cause loss of vegetation cover and loss of species habitat in the Core Direct Area and Immediate Impact Area, and it will lead to landscape disturbance.

ii) Air pollution

Stockpiling of materials can cause air pollution by pollutant dispersion, if material storage is not carried out correctly in the Core Direct Area andImmediate Impact Area.

iii) Soil pollution

Stockpiling of materials during mobilization may cause soil pollution by accident spills.

iv) Surface water pollution

Stockpiling of materials and earthworks can lead to an increment of Suspended Solids (SS) in the surface waters.

6.3.2 Potential Impacts During Construction Phase

POSITIVE IMPACTS

i) Impact on local employment opportunities

Creation of temporary employment during construction is expected to increase income of the people around the project sites. The project will create temporary employment particularly for Site Engineers, Foremen, skilled and non-skilled labour.

The impacts can be summarized as follow:

- Creation of jobs for local people and thereby improving the quality of life for workers and their families; It is estimated a number of workers between 150 to 250.
- Creation of opportunities for the provision of services and supply of materials for small businesses;
- Transfer of skills to local workers and be able to apply them in future similar or related activities to promote socio-economies of their households.

NEGATIVE IMPACTS

Considering the Infrastructure Upgrading in Unplanned Settlements Sub-projects under the DMDP occurring the area of Il 3 intervention ant Kigilagila, it is expected all the impacts to be cumulative to the ones resulting for these Sub-project construction.

i) Noise levels increment

Throughout the construction phase, the main impacts originated from noise levels and vibrations are caused by compressors and vibrators used to compact/ reinforce concrete together with the movement of vehicles and machinery allocated to construction works.

Certain levels of noise are unavoidable in the vicinity of construction sites and some elevation of background levels is normally acceptable for limited periods. Excessive noise, particularly when experienced continuously, outside normal working hours and on rest days, can be a nuisance to both workers and the public, and in extreme cases it may become a health hazard.

Nevertheless it is safe to say that the residual negative impact after implementation of mitigation measures is of minor significance.

ii) Air Pollution

The transportation and storage of aggregates and earth materials will likely result in dust pollution, if preventive measures are not implemented. Potential emergence of odours can also occur in this phase, caused by the handling of contaminated storm water, both in the Core Direct Area and Immediate Impact Area.

Also, the excavation of soils during dry seasons is likely to result into emission of dust, hence creating nuisance to the adjacent residential, commercial and business premises. The emission of exhaust fumes from construction equipment and/or machinery is also likely to create air pollution.

iii) Surface Water pollution

The main expected impacts on surface water caused by the project construction activities are associated with the risk of contamination by occasional spills, earthworks leading to an increment of Suspended Solids (SS) and waste removal both in the Core Direct Area and Immediate Impact Area.

iv) Disruption of natural drainage network

Construction activities may disrupt the natural drainage network causing flooding situations in the Core Direct Area and Immediate Impact Area.

v) Waste production

During construction phase, several kinds of waste will be generated, including organic matters from vegetation clearance of the site, papers and households wastes from work camps and from the site, iron pieces and scraps from cutting and fixing of parts, waste oil from services and maintenance of vehicles and machinery, concrete and soil and rocks. Although the project is not expected to generate hazardous materials which are toxic to human beings and other living creatures, the wastes generated could affect the population and the surrounding ecosystems.

Appropriate mitigation measures and waste management plans need to be in place during construction to reduce the impact. With the mitigation measures in place, the residual impact is considered to be of minor significance.

vi) Loss of habitat, ecosystem and land use

During construction phase, movement of machinery and vehicles will increase dust particles in suspension, which may indirectly affect surrounding crops. The destruction of natural vegetation, mainly mangrove tress will occur during river training. Also, the impact created by the establishment of construction camps will result in habitat loss. These impacts occur in the Core Direct Area and Immediate Impact Area.

vii) Destruction of flora and fauna disturbance

The establishment of construction camps and of other construction facilities will result in anthropogenic disturbance created by its operation. The impacts associated with this action will be felt particularly by animal species that depend on the affected habitats, which have smaller vital areas and / or which are more sensitive to anthropogenic disturbance.

Temporary access construction will be preceded by clearing activities, which will prolong disturbances caused by these on vegetation.

Movement of machinery and vehicles will increase dust particles in suspension, which may indirectly affect surrounding flora and provides increased exclusion effect on fauna community, particularly mammals, and enhances the occurrence of direct mortalities.

During the construction phase the disturbance caused by human presence, along with the noise resulting from construction activities will also increase the exclusion effect on the fauna community, namely mammals and birds.

These impacts will be felt in the Core Direct Area and Immediate Impact Area.

viii) Land take

The most significant negative environmental and social impact associated with storm water drainage project relate to the construction phase is land take for construction/rehabilitation surface water drains in Kinondoni Municipality and detention pond. Although the Project was designed to minimize as much as possible the number of households to be affected will be provided in the final EIA report.

The land take will lead to loss of agricultural land and access to natural resources caused by the construction of the detention pond and involuntary resettlement.

ix) Traffic accidents

During construction phase, there may be potential risk for increasing traffic accidents in the Area of Influence and along access roads as a result of frequent movement of construction vehicles/equipment, that can be caused by a poor management of traffic and vehicles associated with speeding.

x) Disruption of service utilities

There may also be a potential risk for disruption of service utilities of water/power during works causing inconvenient to the population.

xi) Occupational and community health and safety

Throughout the construction phase there will be some concerns related to health to consider namely HIV/AIDS and other occupational health effects. The risk for HIV/AIDS pandemic and other social diseases is important to consider due to an expected increase of social interaction between workers and/or communities. It is also important to evaluate the risk for HIV/AIDS pandemic and other social diseases during the construction phase due to geographical characteristics of the Project area which can attribute to the influence of high infection rate and deters efforts to combat the disease. The risk of disease contamination due to the interaction and behaviour of workers and local community may lead to death and subsequently loss of working force or creation of parentless children (orphans).

Measures should be taken to raise awareness to workers about STDs, HIV and AIDS through education promotion materials such as leaflets, placards, shirts, arts, etc. With mitigation measures in place, the residual impact is moderate.

Transmission of diseases by birds and pests and contaminated water

In addition to HIV/AIDS, other diseases transmitted by birds and pests or via contaminated water are likely during construction. With regards to birds, bird droppings and nesting materials are capable of carry over 60 diseases and ecto-parasites transmittable to humans and animals. These diseases can be transmitted to the young, elderly and those living with autoimmune diseases. In the city of Dar es Salaam, the Indian Black crows are notorious for scavenging on waste and can spread water borne diseases to susceptible individuals.

Storm water management usually deals with the transmission and storage of water to different neighbourhood thus there is much concern about the proliferation of mosquito breeding habitat, during construction phase. However, it should be noted that detention pond for holding storm water runoffs usually does not produce mosquitoes in sufficient numbers to cause health risk problem.

Finally, the main effects on occupational health during the construction phase are wound/infections resulting from bite by animals feeding on storm water and waste along the project site; infections transmitted by house flies feeding on storm water and waste along the project site; skin and blood infections resulting from direct contact with the storm water; respiratory infections resulting from exposure to infected dust and; several injuries that may occur from construction activities such as cutting and hammering.

Accidents and Injuries

Health and safety effects can also be caused by poisoning and chemical burns resulting from contact with polluted storm water, injuries resulting from accidents at sites drains and rivers, injuries resulting from contact with sharp objects and from activities developed at the workplace, such as handling equipment. The residual impact after implementation of the mitigation measures is minor. Hence, project proponent must put mitigation in place including providing clear instructions, safety measures, providence of safety gears and awareness training.

xii) Impact on archaeological and cultural heritage

Construction works can directly or indirectly affect the proposed site if it happens to have an archaeological, historical, cultural or religious significance.

6.3.3 Potential Impacts During Operation Phase

POSITIVE IMPACTS

i) Improved quality of public health

The implementation of the project will contribute to the reduction of flooding during the rainy season and reduction of soil erosion by the improvement of drainage infrastructures. The rehabilitation of the storm water drains may also contribute the improvement of the visual appearance and aesthetics of the urban landscape of the city of Dar es Salaam, due to the waste removal.

Implementation of the project will contribute to the improvement of the quality of life of the population, with sustainable and efficient system of infrastructures development. This improvement will in some way, contribute to the fulfilment of DMDP objectives, with regard to the health of the populations.

The expected positive impacts can be summarised as follow:

- Reduction of flooding during the rainy season and consequently reducing water-related diseases such as malaria, cholera etc.
- Safer and more sustainable storm water drainage system in the Municipality of Kinondoni;
- Expansion of local capacities in terms of infrastructures;
- Better housing facilities due to improvement of drainage infrastructure and water supply facilities.

ii) Improvement of landscape visual quality

There will be a permanent change in the visual setting of the landscape due to the presence of a better and improved infrastructure system in the Core Direct Area and Immediate Impact Area.

Considering the Infrastructure Upgrading in Unplanned Settlements Sub-projects under the DMDP occurring in the area of Il 3 intervention at Kigilagila, it is expected this impact to be cumulative to the ones resulting for these sub-projects implementation leading to a global improvement of the visual appearance and aesthetics of the urban landscape of the city of Dar es Salaam.

NEGATIVE IMPACTS

i) Ground water pollution

During this phase there is the risk of groundwater contamination. Storm water, if not properly controlled and polluted, can infiltrate in the soils and consequently reach the ground water in the Core Direct Area and Immediate Impact Area.

ii) Surface Water Pollution

During this phase, the main impacts expected in surface waters are the risk of contamination. Storm water if not properly controlled can cause an increase in the water flows along the rivers discharge

and consequently contaminate receiving water bodies through pollutants that may be contained in the storm water.

iii) Soil pollution

During this phase, there is the risk of soil contamination by illegal discharges. As mentioned above, storm water, if not properly controlled, can cause an increase of water flow along the river discharge and consequently, contaminate receiving water bodies and soils.

iv) Emergence of bad odours

There is a risk for emergence of odours due to the possible contamination of storm water if uncontrolled discharges of waste water and waste disposal in the channels occur.

v) Damages to nearby properties and infrastructures

The implementation of the Project, by the improvement of drainage structures will contribute to the reduction of flooding during the rainy season. Nevertheless if not properly controlled storm water can damage nearby properties and infrastructure.

vi) Transmission of diseases

The implementation of the Project, by the improvement of drainage structures will contribute to the reduction of flooding during the rainy season and consequently reduce water-related diseases such as malaria, cholera etc. However if poorly managed stagnation of rain waters may lead to birds and pets related diseases resulting in disease vectors with a potential to affect the health of people within the community.

The detention ponds will present a unique environmental or water quality challenge. These ponds, comprising stagnated waters from times to times, may eventually become habitats for snails and mosquitoes, thereby causing malaria and schistosomiasis epidemics.

vii) Risk of drowning for the population during heavy rains

Additionally, there is the risk of drowning for the population during heaving rains on the detention pond especially sensitive groups such as children and elderly.

viii) Waste Production

Waste Production of waste concrete, debris, iron and steel waste by surface water drainage infrastructures maintenance and neighbouring residents haphazardly disposing waste in drains.

TABLE 29

IMPACT EVALUATION IN THE MOBILIZATION PHASE

Impact	Type of impact						Significance
	Nature	Effect	Extent	Duration	Likelihood	Magnitude	
Local employment opportunities	Positive	Direct/ Cumulative	Regional/ Local	Short term	Definite	Medium	Moderate
Opportunities for local traders	Positive	Direct/ Cumulative	Regional/ Local	Short term	Likely	Medium	Moderate
Landscape disturbance and loss of vegetation cover and habitats.	Negative	Direct/ Cumulative	On site	Short term	Likely	Medium	Moderate
Air pollution	Negative	Direct/ Cumulative	On site	Short term	Likely	Medium	Moderate
Soil pollution	Negative	Direct/ Cumulative	On site	Short term	Likely	Low	Minor
Surface water pollution	Negative	Direct/ Cumulative	On site/Local	Short term	Likely	Low	Minor

(PROCESL/COWI, 2014)

TABLE 30

IMPACT EVALUATION IN THE CONSTRUCTION PHASE

Impact	Type of impact						Significance
	Nature	Effect	Extent	Duration	Likelihood	Magnitude	
Impact on local employment opportunities	Positive	Direct	Regional/ Local	Short term	Definite	Medium	Moderate
Noise levels increment	Negative	Direct/ Cumulative	On site/Local	Short term	Likely	Medium	Moderate
Air pollution	Negative	Direct	On site/Local	Short term	Likely	Medium	Moderate
Surface water pollution	Negative	Direct/ Cumulative	On site/Local	Short term	Likely	Low	Minor

Impact	Type of impact						Significance
	Nature	Effect	Extent	Duration	Likelihood	Magnitude	
Disruption of natural drainage network	Negative	Direct/ Cumulative	On site/Local	Temporary	Likely	High	Major
Waste production	Negative	Direct/ Cumulative	On site	Short term	Definite	Medium	Moderate
Loss of habitats, ecosystem and land use	Negative	Direct/ Cumulative	On site	Short term	Likely	Medium	Moderate
Anthropogenic disturbance on fauna and flora	Negative	Direct (Flora) Indirect (Fauna) and Cumulative	On site/Local	Short term (Flora) Temporary (Fauna)	Likely	Medium (Fauna)	Moderate
Land take	Negative	Direct/ Cumulative	On site	Short term	Definite	High	Major
Traffic accidents	Negative	Direct/ Indirect/Cumulative	Local	Temporary	Likely	Low/ Medium	Minor Moderate
Disruption of service utilities	Negative	Direct/ Cumulative	On site	Temporary	Likely	Medium	Moderate
Impact on occupational and community health and safety	Negative	Indirect/ Cumulative	Local	Short term	Likely	Medium	Moderate
Transmission of diseases by birds and pests. Transmission of diseases by contaminated water.	Negative	Direct/ Indirect/Cumulative	On site	Temporary	Likely	Low/ Medium	Minor Moderate
Accidents and injuries originated by construction activities such as cutting and hammering.	Negative	Direct/ Cumulative	On site	Temporary	Likely	Low/ Medium	Minor Moderate
Impact on archaeological and cultural heritage	Negative	Direct/ Indirect/Cumulative	On site	Temporary	Unlikely	Low	Minor

(PROCESL/COWI, 2014)

TABLE 31

IMPACT EVALUATION IN THE OPERATION PHASE

Impact	Type of impact						Significance
	Nature	Effect	Extent	Duration	Likelihood	Magnitude	
Improved quality of public health	Positive	Indirect	Local	Long term	Definite	High	Major
Improvement landscape visual quality.	Positive	Direct/ Cumulative	Local	Long term	Definite	High	Major
Ground water pollution	Negative	Indirect	On site/Local	Long term	Likely	Medium	Moderate
Surface water pollution	Negative	Indirect	On site/Local	Long term	Likely	Medium	Moderate
Soil pollution	Negative	Indirect	On site/Local	Long term	Likely	Medium	Moderate
Emergence of bad odours	Negative	Indirect	On site/ local	Temporary	Likely	Low	Minor
Damages to nearby properties and infrastructures	Negative	Indirect	On site/ local	Temporary	Likely	Medium	Moderate
Transmission of Diseases	Negative	Indirect	On site/ local	Temporary	Likely	Medium	Moderate
Risk of drowning for the population during heavy rains	Negative	Indirect	On site	Temporary	Likely	High	Major
Waste	Negative	Direct/ Cumulative	On site	Temporary	Likely	Medium	Moderate

(PROCESL/COWI, 2014)

6.3 PROJECT ALTERNATIVES

The improvement of the Surface Water Drainage System Sub-project in Kinondoni Municipality includes the expansion, increasing depth, lining and constructing pedestrian bridges at Mto Ng'ombe or Sinza River along about 7,0 km. This intervention had a key element that was the inclusion of two detention ponds on the Sinza River, immediately upstream of Sam Nujoma Road Bridge (in the Maji – Ubungo area) using undeveloped land, next to Water Development and Management Institute. The function of the detention pond was to minimize the interventions on the downstream stretches of the Sinza River which extends in an easterly direction for around 10 km.

Following the review and approval of the Stage Ia Report by PMO-RALG/WB and the various consulted stakeholders, some issues were raised as the next stage of the design development process commenced. This related with the development projects proposed for this area by Ministry of Water, comprising some new buildings, sports/ recreational area and a water treatment plant.

Following several meetings with PMO-RALG, WB and Ministry of Water representatives it was possible to receive the information about the expected future occupation of the land selected to the construction of the mentioned detention ponds which was properly considered in the final lay-out of the proposed solution.

Taking in account the questions raised about the detention ponds the Project Stage Ib (Feasibility Study and Preliminary Engineering Designs) was divided in two different reports and considered different alternatives.

It is important to mention that in the development feasibility studies, designs and analysis of options, there was an effort towards the minimization of the environmental impacts identified, with greater emphasis on the resettlement of populations. The EIA and design team, have worked together and in an integrated way adopting, as far as possible, the necessary minimization measures to mitigate the impact on households.

"1.0 Definition and Comparison of Solutions to Adopt" (November 2013)

In this report two alternatives were considered:

- Alternative 1: Inclusion of two detention ponds on the Sinza River at Maji-Ubungo area and several selected interventions along the watercourse to widen and/or improve the river to meet the necessary hydraulic requirements;
- Alternative 2: No inclusion of the detention ponds on the Sinza River at Maji-Ubungo area but to implement several interventions along the watercourse to widen and/or improve the river to meet the necessary hydraulic requirements.

The conducted study analysis shows the needed of deeper channels in Alternative 2 when comparing with Alternative 1 and the necessity to enlarge 6 bridges in Alternative 2, while in the Alternative 1 only 2 bridges will be affected.

It is important to note that the detention ponds were designed for a 1 in 25 year flood event and would drain back downstream naturally as the high flows drop a day or so after the flood. During normal rainfall conditions there would be no water in the detention pond therefore the land would be available for informal use, recreation or agriculture.

The comparison of the two alternatives was focused on two main aspects:

- The cost of the intervention works;
- The need for resettlement caused by the enlargement of the river sections.

From the performed analysis it was is clear that Alternative 1 offed the best option both in terms of lowest construction cost and through reduced impact on people and property.

Alternative 1 is significantly cheaper than Alternative 2 and indicates the importance of the inclusion of the detention ponds.

Similarly, the extent of channel widening required to accommodate the peak flow without the throttling effect of the detention ponds, results in a large disparity on the resettlement, with about 50 more properties requiring demolition. This is more than two times that required to accommodate Alternative 1.

This sub-project has such high sensitivity to the inclusion (or not) of a detention pond that further dialogue with stakeholders was highly recommended to try and secure the necessary permissions to site the detention ponds at the proposed location.

Based on the agreement in principle and the provision of the proposed development information for the detention ponds area from the Ministry of Works, following the meetings involving representatives of PMO-RALG, World Bank, Ministry of Works and Water Development and Management Institute concerning the detention ponds, the project design was developed on the assumption that the modified/integrated ponds will be properly incorporated into the proposed Development Plan for the detention ponds area.

This alternative was approved in February 17th 2014, under a letter from PMO-RALG stating to continue the designs development considering the inclusion of the detention ponds.

"1.1 Preferred Option Analysis and 1.2 Preliminary Design" (February 2014)

Taking into account the conclusions of the previous report was possible to develop an analysis of the preferred option and proceed with the preliminary design.

This this report assumes the construction of the detention ponds integrated with the development proposals of Ministry of Water, namely some new buildings, sports/ recreational area and a water treatment plant.

It is important to mention that, once the DMDP initiative comprises a raft of different sectorial projects designed to strengthen the institutional and urban management systems of the Dar es Salaam DLA's and that, in many cases these projects are interrelated in nature and often overlap physically within the drainage project, several meeting were conducted with the consultants for the Solid Waste Management, Local Roads and Infrastructure Upgrading in Unplanned Settlements, in order to co-ordinate scope and design assumptions to align the preliminary and detailed designs.

Attending to the advantages of incorporating upstream detention ponds to control the storm water flows, the options considered in the feasibility analysis were:

- The base option "*No Project Alternative*", assuming that the Surface Water Drainage System Sub-project in Kinondoni Municipality will not be improved at all and that the Sinza River basin area will continue to experience flooding problems;
- The "*Project implementation*" option corresponding to the previously proposed intervention which includes the inclusion of two detention ponds on Sinza River in the Maji-Ubungo area with approximately 20,000 m^2 and 40,000 m^2 ponds (volumes of water of 39,000 m^3 and 65,000 m^3) which will function as adequate detention ponds for attenuating the storm water peak flow and for fixing the flow to be drained to the downstream area, as well as a set of selected interventions along the water course to widen and/or improve the river to meet the necessary hydraulic requirements, namely its general enlargement/deepening, the lining in concrete or/and gabions and the reconstruction of some of the existing bridges over the river.

The *No Project Alternative* essentially serves as a comparator against which a measure of the benefits introduced by implementing the proposed option can be made. In particular, an economic assessment must first consider the estimated damage to people, property and services/infrastructure caused by inaction (the "do nothing") to then analyse the estimated benefits or savings generated by improved infrastructure that better handles storm waters in a flood event.

Thus *No Project Alternative* option simply maintains the current arrangement with no extra expenditure made to improve the existing situation.

This situation is already resulting into environmental health hazards to the local residents, especially the vulnerable poor section of the community living in unplanned settlements. The flooding events will also continue to damage the existing infrastructure and utilities.

In general, apart from creating health problems among the local community the flooding events will continue to create damage the individual properties, hence perpetuating poverty in the area.

The "*Project implementation*" option considers flood protection works designed to prevent or mitigate flooding in built areas where lives would be at risk and/or damage to properties would be serious.

To protect the referred areas from inundation (diminishing the probability of occurrence) different solutions can be adopted:

- To construct protective flood embankments around the areas at risk. Given the characteristics of the study area, a densely occupied zone with a significant number of houses invading the natural stream bed, this solution is impractical unless the areas are very compact or localised, such as the stretch between Sam Nojoma and Shekilango Roads where some concrete walls are proposed for protecting specific punctual flooded areas;
- To enlarge/ deepen the existing channels/ streams to the dimensions that would contain the estimated design flood. As for the previous situation, there is not enough space for this type of solution without considering the demolition of some houses. This corresponds in the general to the proposed solution;
- To construct a flood relief channel/ infrastructure outside the current path, to take the surplus flood water. As the intervention is along a single river following the low margins of a valley, surrounded by densely occupied urban areas, any overall solution of this type would be both a very intrusive and expensive solution;
- To redevelop the intervention area, demolishing all the buildings located along the flood areas. This solution, the most drastic one, is explicitly discouraged by the World Bank who prefer that the impact on peoples' lives and the need for resettlement is minimised;
- To reduce the magnitude of the incoming peak flow, implementing the construction of detention ponds. In fact the vulnerability of the exposed people/properties to floods will depend, among other factors, on the flood hazard profile: magnitude and probability of occurrence of a flood.

As a result of the previews analysis the "*Project implementation*" option considers the interventions presented in chapter 2.0.

CHAPTER 7.0: MITIGATION MEASURES

7.1 MOBILIZATION PHASE

Enhancement Measures

i) ***Local employment opportunities*** **-** Give employment priority to the local residents;

ii) ***Opportunities for local traders*** **-** Give opportunities to local/small businesses regarding the purchase of materials and trade with contractor.

Mitigation Measures

i) ***Landscape disturbance and loss of vegetation cover and habitats***

- Proceed to the immediate replacement of the soils removed in the opening trenches;
- Ensure cleanliness and proper maintenance of ditches and all river extensions;
- A layer of topsoil should be stored in order to replace it at the closure of opened trenches.

ii) ***Air pollution***

- Burning of vegetation is not allowed for site clean-up;
- The excavation, handling and transport of erodible materials should be avoided in windy conditions;
- Moderate speeds must be adopted when crossing inhabited or sensitive areas;
- Vehicles carrying fine materials / particulate type must be covered during transportation;
- Wet work areas at a rate that does not cause erosion or runoff;
- The contractor must ensure the regular cleaning of access roads and unpaved areas to avoid the accumulation of dust either by wind or by the movement of vehicles and equipment related to the construction.

iii) ***Soil Pollution***

- Assure proper and secure stockpiling of materials during mobilization activities to avoid accidental spills; and
- Assure regular inspection of the stockpiled materials.

iv) ***Surface water pollution***

- All mobilization activities that could endanger the water quality of receiving rivers should be avoided and controlled through site planning of mobilization activities and the preparation of a site procedures protocol;
- Prevent the stockpiling of materials on natural drainage lines and ditches;

- The deliberate disposal of wastes and other materials during mobilization must be forbidden, even temporarily, in the banks and beds of water lines as well as in the areas of high infiltration.

7.2 CONSTRUCTION PHASE

Enhancement Measures

i) ***Local employment opportunities***

- Local employment opportunities will be enhanced by giving employment priority to the local residents;

Mitigation Measures

i) Noise levels increment

- Noise sources shall be relocated to less sensitive areas to take advantage of distance;
- Reduce project traffic routing through community areas wherever possible;
- Develop a mechanism to record and respond to complaints;
- Noise emissions shall comply with applicable laws in force in the country; and
- Limit works to daylight hours. Stop noisy construction during the night hours (18.00 – 6.00).

ii) Air Pollution

- Burning of vegetation is not allowed for site clean-up;
- The excavation, handling and transport of erodible materials should be avoided in windy conditions;
- Moderate speeds must be adopted when crossing inhabited or sensitive areas;
- Vehicles carrying fine materials / particulate type must be covered during transportation;
- Wet work areas at a rate that does not cause erosion or runoff; and
- The contractor must ensure the regular cleaning of access roads and unpaved areas to avoid the accumulation of dust either by wind or by the movement of vehicles and equipment related to the construction.

iii) Surface Water pollution

- All construction activities that could endanger the water quality of receiving rivers should be avoided and controlled through site planning of construction activities and the preparation of a site procedures protocol;
- Ensure awareness of city dwellers to avoid waste disposal and contaminated effluents in the storm water drainage system;
- Natural flow regimes must be maintained;

- Should be not permit the flow of muddy water or perform uncontrolled discharges from the work areas (including washing) for the adjacent water courses and/or water bodies;
- The water containing pollutants such as cement, concrete, lime, chemicals and fuels must be discharged into a temporal tank for a later removal from the site;
- Contaminated water should in no way be discharged into municipal sewer system;
- Prevent the accumulation of soil on natural drainage lines, ditches;
- The deliberate disposal of wastes must be forbidden, even temporarily, in the banks and beds of water lines as well as in the areas of high infiltration.

iv) Disruption of natural drainage network

- Natural flow regimes must be maintained meaning, whenever necessary, alternative and temporary drainage must be implemented;
- The sedimentation of rivers and streams for construction materials should be minimized.

v) Soil erosion and sedimentation

- Site clearance will only be undertaken when immediately required to permit adherence to the approved Programme of Work. The maximum permitted elapsed time between site clearance and the initiation of construction will be 5 days. The Contractor will adopt a site clearance procedure that separates topsoil and stores it under appropriate conditions for reuse as instructed by the Engineer.
- The Contractor will take all reasonable measures, including the use of settling ponds, to protect cleared sites and open excavations from erosion due to rainfall and avoid discharge of suspended sediment to watercourses and drainage ditches.
- All temporary discharge points shall be located, designed and constructed in a manner that will minimise soil erosion in the receiving channels.
- The on-site storage of excessive quantities of unwanted spoil and aggregate materials will be avoided. Where storage is necessary, the Contractor will ensure that stockpiled soils are located at sites that do not permit direct runoff into watercourses;
- Construction materials will only be procured from licensed extraction sites.

vi) Waste production

- All wastes produced, including construction and demolition debris, must be collected by licensed private/municipal service providers;
- Solid wastes must be categorized according to their physical characteristics e.g. paper, plastic, and metals;
- For work camps and office waste, there should be four bins: paper materials; organic materials; glass wastes; and plastic materials; The contractor is to oversee this process and collect these in a secure area at the contractor's camp site.

- Construction sites and temporary warehouses should be cleaned to prevent indiscriminate fires, burial or abandonment of waste;
- During construction contractor has option of sorting waste and have scrap metal, wood and plastic bottles sold to local petty traders who collect them.
- Dar es Salaam City will be subcontracted to dispose the wastes, thus all waste are to be dumped at the current official dump which is at Pugu, and not to be taken to any transfer station. If the official dump changes during the course of the project implementation, the municipal will specify where the official dump is.

vii) Loss of habitat, ecosystem and land use

- Proceed to re-vegetation of affected areas with some indigenous species to prevent erosion and to provide a useful after-use of the affected land, as the use of species consistent with agricultural, recreational or leisure uses.

viii) Destruction of flora and fauna disturbance

- The removal of vegetation shall be avoided whenever possible and the exposed areas shall be restored as soon as possible;
- Construction camps and material parks shall not be located in sensitive locations;
- Limit the removal of vegetation to the minimum necessary;
- The removal of topsoil should precede any construction work, and must be preserved and put back after construction to allow rapid growth of vegetation. This operation should take place in dry season.

ix) Land take

- All grievances related to land and properties must be reported to the authorities for conflict resolution;
- All PAPs should be paid compensation according to RAP and RPF framework as well as the laws of the country;
- Establish dispute resolution committees;
- Educate the affected people about legal resolution mechanism.

x) Traffic accidents

- Construction of physical barrier such as road humps to reduce speed;
- Prohibit construction of new roads unless it is absolutely necessary;
- Access to the construction site and work areas should be done using existing roads;
- Place appropriate traffic signs along access roads;
- Impose speed limits at sites and intervention adjacent areas;
- Make arrangements for traffic diversions in terms of Traffic Management Plan.
- Comply with all applicable laws regarding safety and road transport.

xi) Disruption of service utilities

- Perform a preliminary survey on the location of existing infrastructures that may be damaged by construction activities of the storm water drainage system;
- The interruption of services (water, telephone, electricity etc..) should be minimized through a careful planning, close supervision and a continuous community information program;
- The interruption of services must be notified to the community beforehand;
- The need for temporary site drainage during the construction phase should be considered;
- Notify in advance the competent authorities about the interruption of roads, water supply or energy.

xii) Impacts on occupational and community health and safety

- The space provided for each worker, and in total, should be adequate for safe execution of all activities, including transport and interim of materials and products;
- Workers must be informed about STDs, HIV and AIDS to raise awareness. Information can be disseminated through education promotion materials such as leaflets, placards, shirts, arts, etc.
- Inform workers about the risks of flooding during major rainstorms;
- Provide First Aid kit at each work camp and other working facilities;
- Formulate and implement appropriate emergency procedures (such as spill and fire response);
- Provide appropriate Personnel Protective Equipment (PPE);
- Provide sanitary and safety facilities;
- Provide health education and training;
- Implement community sensitization programs on the risk for public health and safety caused by obstruction and destruction of storm water drains, the pollution of storm water and the risk associated with the detention pond flooding;
- Install equipment, where feasible, to enable routine service, such as lubrication, without removal of the guarding devices or mechanisms;
- Exposure to hand-arm vibration from equipment must comply with the limits for vibration and action values that are provided by the American Conference of Governmental Industrial Hygienists (ACGIH) and exposure levels should be checked on the basis of daily exposure time and data provided by equipment manufacturers;
- For the safety of the workers a cofferdam it must be done for the works realized on the river bed;
- The works realized on the river bed must be done in the dry season.

xiii) Impacts on archaeological and cultural heritage

- The discovery of any tombs, archaeological or cultural elements previously unidentified during the clean-up must be notified to the authority immediately. Construction works must be stopped to allow site investigation and approval process through the *division of antiquity* which functions under the Ministry of Natural Resources and Tourism. The Project construction must be done with appropriate respect for sites of cultural and religious significance.

7.3 OPERATION PHASE

Enhancement Measures

i) Improved quality of public health

- Implement community sensitization programs on the risk for public health and safety caused by obstruction and destruction of storm water drains, the pollution of storm water and the risk associated with the detention pond flooding;
- Promote introduction of improved pit latrines in unplanned settlements and introduce construction of sewerage systems; and
- Promote education and awareness campaigns on solid waste management.

ii) Improvement of landscape visual quality

- Promote introduction of improved pit latrines in unplanned settlements and introduce construction of sewerage systems; and
- Promote education and awareness campaigns on solid waste management.

Mitigation Measures

i) Ground water pollution

- Cleaning out clogged outlet and drainage system in the detention pond;
- Ensure awareness of city dwellers to avoid waste disposal and contaminated effluents in the storm water drainage system;
- Assure regular inspection of the storm water drainage;
- Assure clearing of all components of the storm water drainage system.

ii) Surface water pollution

- Ensure awareness of city dwellers to avoid waste disposal and contaminated effluents in the storm water drainage system;
- Assure clearing of all components of the storm water drainage system;

- Assure regular inspection of the storm water drainage;
- The removal and properly disposal of the accumulated sediments in the detention pond;
- Removal of eventual unwanted vegetation especially on embankment (when applicable) in the detention pond;
- Cleaning out clogged outlet and drainage system in the detention pond.

iii) Soil pollution

- Assure clearance of all components of the storm water drainage system; and
- Assure regular inspection of the storm water drainage.

iv) Emergence of bad odours

- Cleaning out clogged outlet and drainage system in the detention pond;
- Assure clearing of all components of the storm water drainage system;
- Assure regular inspection of the storm water drainage

v) Damages to nearby properties and infrastructures

- Assure regular inspection of the storm water drainage; and
- Efficient control of storm water.

vi) Transmission of diseases

- Assure clearing of all components of the storm water drainage system;
- Assure regular inspection of the storm water drainage; and
- Implement community sensitization programs on the risk for public health and safety caused by obstruction and destruction of storm water drains and the risk associated with the detention pond flooding.

vii) Risk of drowning for the population during heavy rains

- Attach of warning signs, barriers, and other precautions on all areas of potential risk.
- Implement community sensitization programs on safety measures to be taken.

viii) Illegal connections and dumping of waste

- Periodic cleaning of open drainage channels will be executed by Kinondoni Municipal Council in collaboration with the local communities. The Kinondoni Municipal Council shall enforce by-laws to discourage people and local industries against throwing solid and liquid wastes and discharging sewage wastes into drainage channels. This should also go in parallel with education and awareness campaigns on proper solid wastes management;

- All waste produced during maintenance works must be collected by licenced private/municipal service providers.

CHAPTER 8.0: ENVIRONMENTAL MANAGEMENT PLAN

The proposed Environmental Management Plan (EMP) is a plan for monitoring and managing the impacts during mobilization, construction and operation phases of the project. This EMP is a document which encompasses all major environmental and social impacts associated with the Sub-project construction and its alternative mitigation measures.

The EMP addresses specific issues to be managed at the construction site and ensures that commitments made during the planning phase are incorporated into all project phases, presenting the implementation responsibilities during mobilization, construction and operation phases. The EMP for this project is presented below;

TABLE 32

EMP IMPLEMENTATION IN THE MOBILIZATION PHASE

	Potential Impacts		Enhancement Measures	Responsibilities for implementation	Cost In Tshs	Time frame
1	Local employment opportunities		Give employment priority to the local residents.	Contractor supervised by Resident Engineer	516,920 per day	Before the commencement of the works
2	Opportunities for local traders		Give opportunities to local/small businesses regarding the purchase of materials and trade with contractor.	Contractor supervised by Resident Engineer	--	During mobilization period
	Potential Impacts		**Mitigation Measures**	**Responsibilities for implementation**	**Cost In Tshs**	**Time frame**
3	Loss of vegetation cover and loss of species habitat	Vegetation clearance	Proceed to the immediate replacement of the soils removed in the opening trenches; Ensure cleanliness and proper maintenance of ditches and all river extensions; A layer of topsoil should be stored in order to replace it at the closure of opened trenches.	Contractor supervised by Resident Engineer	11,000,000	During mobilization period
4	Air pollution	Stockpiling of materials can cause air pollution by pollutant dispersion.	Burning of vegetation is not allowed for site clean-up.	Contractor supervised by Resident Engineer	Included in item 3 above	
			The excavation, handling and transport of erodible materials should be avoided in windy conditions.			
			Moderate speeds must be adopted when crossing inhabited or sensitive areas.			
			Vehicles carrying fine materials / particulate type must be covered during transportation.			
			Wet work areas at a rate that does not cause erosion or runoff.			
			The contractor must ensure the regular cleaning of access roads and unpaved areas to avoid the accumulation of dust either by wind or by the movement of vehicles and equipment related to the construction.			
5	Soil pollution / Surface water pollution	Stockpiling of materials can cause soil pollution by accidental spills.	Assure proper and secure stockpiling of materials during mobilization activities to avoid accidental spills.	Contractor supervised by Resident Engineer	---	
			Assure regular inspection of the stockpiled materials.			
		Stockpiling of materials and earthworks can lead to an	Prevent the accumulation of soil on natural drainage lines and ditches.	Contractor supervised by Resident Engineer	---	

		increment of Suspended Solids (SS) in the surface waters.				

(PROCESL/COWI, 2014)

TABLE 33

EMP IMPLEMENTATION IN THE CONSTRUCTION PHASE

	Potential Impacts		Enhancement Measures	Responsibilities for implementation	Cost In Tshs	Time frame
6	Local employment opportunities		Local employment opportunities will be enhanced by giving employment priority to the local residents	Contractor supervised by Resident Engineer	516,920 per day	Before the commencement of the works
	Potential Impacts		**Mitigation Measures**	**Responsibilities for implementation**	**Cost in Tshs**	**Time frame**
8	Air pollution	Transport and storage of aggregates and earth materials may produce dust. Movement of machinery and vehicles will increase dust particles in suspension, which may indirectly affect surrounding crops.	Burning of vegetation is not allowed for site clean-up.	Contractor supervised by Resident Engineer	---	During construction period
			The excavation, handling and transport of erodible materials should be avoided in windy conditions.		---	During earthmoving activities
			Moderate speeds must be adopted when crossing inhabited or sensitive areas.		---	During construction period
			Vehicles carrying fine materials / particulate type must be covered during transportation.		Included in item 3 above	During transportation of materials
			Wet work areas at a rate that does not cause erosion or runoff.			During construction period
			The contractor must ensure the regular cleaning of access roads and unpaved areas to avoid the accumulation of dust either by wind or by the movement of vehicles and equipment related to the construction.			
		Emergence of odours can also occur in this phase, caused by the handling of	Bad odour can be eliminated by cleaning the trenches and ensuring no existence of stagnant water.	Contractor supervised by Resident Engineer		During construction period

		contaminated storm water.				
9	Increasing noise levels and vibration	Movement of machinery and vehicles may increase noise levels and vibrations which can affect the people and fauna.	Noise sources shall be relocated to less sensitive areas to take advantage of distance.	Contractor supervised by Resident Engineer	---	During construction period
			Reduce project traffic routing through community areas wherever possible.	Contractor supervised by Resident Engineer	---	
			Develop a mechanism to record and respond to complaints.		4,000,000 from provisional sum	Before commencement of works and during construction period
			Noise emissions shall comply with applicable laws in force in the country.			During construction period
			Limit works to daylight hours. Stop noisy construction during the night hours (18.00 – 6.00).	Contractor supervised by Resident Engineer	---	
10	Surface and groundwater pollution	Construction activities can cause contamination of surface and groundwater by occasional spills and contaminated water handling. Stockpiling of materials and earthworks can lead to an increment of Suspended Solids (SS) in the surface waters.	Fuelling of machinery and vehicles should be done in concrete floors previously identified within the site.	Contractor supervised by Resident Engineer	---	During fuelling of machinery and vehicles
			All construction activities that could endanger the water quality of Sinza River should be avoided and controlled, though site planning of construction activities and the preparation of a site procedures protocol.	Contractor supervised by Resident Engineer	---	Before commencement of works and during construction period
			It should not be permitted to flow muddy water or perform uncontrolled discharges from the work areas (including washing) for Sinza River and the adjacent water courses and/or water bodies.	Contractor supervised by Resident Engineer	---	During construction period
			The water containing pollutants such as cement, concrete, lime, chemicals and fuels must be discharged into a temporal tank for a later removal from the site.	Contractor supervised by Resident Engineer	---	
			Contaminated water should in no way be discharged into municipal sewer system.	Contractor supervised by Resident Engineer	---	
			The deliberate disposal of wastes is forbidden, even temporarily, in the banks and beds of water lines as well as in the areas of high infiltration.	Contractor supervised by Resident Engineer	---	

			Fuels, oils, cement and other materials must be handled properly to avoid spills, like concrete floors.	Contractor supervised by Resident Engineer	---	
			Reduce the exposure time of material capable to be dragged in rainfall event.	Contractor supervised by Resident Engineer	---	
			The maintenance of equipment and vehicles should be done on concrete ground /floor to avoid soil and underground pollution.	Contractor supervised by Resident Engineer	---	
			Ensure awareness of city dwellers to avoid waste disposal and contaminated effluents in the storm water drainage systems.	Contractor supervised by Resident Engineer	9,000,000 capacity building	During construction period
			Prevent the accumulation of soil on natural drainage lines, ditches.	Contractor supervised by Resident Engineer		
			The stacks must be appropriately protected against soil erosion from wind, water currents and rainfall.		---	During construction period
11	Disruption of natural drainage network	Activities in the river.	Natural flow regimes must be maintained meaning, whenever necessary, alternative and temporary drainage must be implemented.	Contractor supervised by Resident Engineer	31,071,600	During construction period
			The sedimentation of Sinza river and streams for construction materials should be minimized.	Contractor supervised by Resident Engineer		
12	Soil erosion and sedimentation	Construction works associated with earthworks and site clearance may lead to siltation	Site clearance will only be undertaken when immediately required to permit adherence to the approved Programme of Work. The maximum permitted elapsed time between site clearance and the initiation of construction will be 5 days. The Contractor will adopt a site clearance procedure that separates topsoil and stores it under appropriate conditions for reuse as instructed by the Engineer.	Contractor supervised by Resident Engineer		During construction period
			The Contractor will take all reasonable measures, including the use of settling ponds, to protect cleared sites and open excavations from erosion due to rainfall and avoid discharge of suspended sediment to watercourses and drainage ditches.			

			Construction materials will only be procured from licensed extraction sites.			
			All temporary discharge points shall be located, designed and constructed in a manner that will minimise soil erosion in the receiving channels.			
			The on-site storage of excessive quantities of unwanted spoil and aggregate materials will be avoided. Where storage is necessary, the Contractor will ensure that stockpiled soils are located at sites that do not permit direct runoff into watercourses.			
14	Waste production	Mismanagement of waste	All wastes produced, including construction and demolition debris, must be collected by licensed private/municipal service providers.	Contractor supervised by Resident Engineer	45,000,000 Environmental protection & waste disposal	During construction period
			Solid wastes must be categorized according to their physical characteristics e.g. paper, plastic, and metals.	Contractor supervised by Resident Engineer		During construction period
			For work camps and office waste, there should be four bins: paper materials; organic materials; glass wastes; and plastic materials; The contractor is to oversee this process and collect these in a secure area at the contractor's camp site.	Contractor supervised by Resident Engineer		
			Construction sites and temporary warehouses should be cleaned to prevent indiscriminate fires, burial or abandonment of waste.	Contractor supervised by Resident Engineer		
			During construction contractor has option of sorting waste and have scrap metal, wood and plastic bottles sold to local petty traders who collect them.			
			Dar es Salaam City will be subcontracted to dispose the wastes, thus all waste are to be dumped at the current official dump which is at Pugu, and not to be taken to any transfer station. If the official dump changes during the course of the project implementation, the municipal will specify where the official dump is.	Contractor supervised by Resident Engineer		

15	Change of land use, habitats and ecosystems	The clearing involves the loss of habitats in the intervention area, changing the ecosystem and land uses.	The removal of vegetation shall be avoided whenever possible and the exposed areas shall be restored as soon as possible.	Contractor supervised by Resident Engineer	Included in item 3 above	During construction period
			Proceed to re-vegetation of affected areas with some indigenous species to prevent erosion and to provide a useful after-use of the affected land, as the use of species consistent with agricultural, recreational or leisure uses.	Contractor supervised by Resident Engineer		After construction works
		Vegetation loss and changes on fauna habitats.	Limit the removal of vegetation to the minimum necessary.	Contractor supervised by Resident Engineer		During construction period
		Increment of dust particles in suspension, which may indirectly affect flora. Exclusion effect on fauna particularly mammals, and enhances the occurrence of direct mortalities.	The removal of topsoil should precede any construction work, and must be preserved and put back after construction to allow rapid growth of vegetation. This operation should take place in dry season.	Contractor supervised by Resident Engineer		Before construction works and in the dry season
		Habitat loss subsequent from the implementation of the facilities and other anthropogenic disturbance created by its operations.	Construction camps and material parks shall not be located in sensitive locations.	Contractor supervised by Resident Engineer		Before construction works
16	Land take and involuntary resettlement	Affection of households and properties.	All grievances related to land and properties must be reported to the authorities for conflict resolution.	PMO-RALG/KMC	2,477,979,067.67	Before commencement of works
			All PAPs should be paid compensation according to laws of the country.			
			Establish dispute resolution committees.			
			Educate the affected people about legal resolution mechanism.			

17	HIV/AIDS	Expected increment of social interaction between workers and/or communities may lead to a risk for HIV/AIDS pandemic and other social diseases.	Workers must be informed about STDs, HIV and AIDS to raise awareness. Information can be disseminated through education promotion materials such as leaflets, placards, shirts, arts, etc.	PMO-RALG/Contractor/DLAs	9,000,000	Before commencement of works
18	Increase traffic and accidents	Risk for an increment of traffic and accidents in the Project area and along access roads.	Place appropriate traffic signs along access roads.	Contractor supervised by Resident Engineer	22,680,000 Ancillary works	Before commencement of works and during construction phase
			Impose speed limits at sites and intervention adjacent areas.			
			Comply with all applicable laws regarding safety and road transport.			
			Prohibit construction of new roads unless it is absolutely necessary.			
			Access to the construction site and work areas should be done using existing roads.			
			Construction of physical barrier such as road humps to reduce speed			
			Make arrangements for traffic diversions in terms of Traffic Management Plan.	Contractor supervised by Resident Engineer		Before commencement of works and during construction phase
19	Water borne diseases	Transmission of diseases by birds and pests. Transmission of diseases by contaminated water.	Inform workers about the risks of flooding during major rainstorms.	Contractor supervised by Resident Engineer	6,000,000 capacity building	Before commencement of works and during construction phase
			Implement community sensitization programs on the risk for public health and safety caused by obstruction and destruction of storm water drains, the pollution of storm water and the risk associated with the detention ponds flooding.	DMDP/PMO-RALG/DLAs		
	Accidental injuries	Accidents and injuries originated by construction activities such as cutting and hammering.	The space provided for each worker, and in total, should be adequate for safe execution of all activities, including transport and interim of materials and products.	Contractor supervised by Resident Engineer	9,000,000 Health and safety	Before commencement of works and during construction phase
			Provide First Aid kit at each work camp and other working facilities.			

20			Formulate and implement appropriate emergency procedures (such as spill and fire response).			Before commencement of works
			Provide appropriate Personnel Protective Equipment (PPE).			Before commencement of works and during construction phase whenever needed
			Provide sanitary and safety facilities.			
			Install equipment where feasible to enable routine service such as lubrication without removal of the guarding devices or mechanisms.			
			Exposure to hand-arm vibration from equipment must comply with the limits for vibration and action values that are provided by the ACGIH and exposure levels should be checked on the basis of daily exposure time and data provided by equipment manufacturers.			During construction phase
			Provide health education and training.			Before commencement of works
			For the safety of the workers a cofferdam must be done for the works realized on Sinza River bed.			During construction phase
			The works realized on the river bed must be done in the dry season.			
	Disruption of utility services and communication routes	Potential risk for disruption of service utilities of water and power that causes inconvenient to the population. Disruption of communication route.	Notify in advance the competent authorities about the interruption of roads, water supply or energy.	Contractor supervised by Resident Engineer in collaboration with public services utility authorities	678,740,921	During construction phase
21			Perform a preliminary survey on the location of existing infrastructures that may be damaged by construction activities of the storm water drainage system.			Before commencement of works
			The interruption of services (water, telephone, electricity etc.) should be minimized, through a careful planning, close supervision and a continuous community information program.			During construction phase
			The interruption of services must be notified to the community beforehand.	Contractor supervised by Resident Engineer		During construction phase
			The need for temporary site drainage during the construction phase should be considered.			

			Make arrangements for traffic diversions in the terms of a Traffic Management Plan.			Before commencement of works
22	Disruption of historical, archaeological, cultural and or religion site	Construction works can directly or indirectly affect the proposed site if it happens to have an archaeological, historical, cultural or religious significance	The discovery of any tombs, archaeological or cultural elements previously unidentified during the clean-up must be notified to the authority immediately (if any). The construction work must be stopped to allow site investigation and approval process.	Contractor supervised by Resident Engineer	Included in item 21 above	During construction phase
			The construction of the proposed project must be done with appropriate respect for sites of cultural and religious significance.			

(PROCESL/COWI, 2014)

TABLE 34

EMP IMPLEMENTATION IN OPERATION PHASE

	Potential Impacts	Enhancement Measures	Responsibilities for implementation	Cost In Tshs	Time frame
23	Improved quality of public health	Implement community sensitization programs on the risks for public health and safety caused by obstruction and destruction of storm water drains, the pollution of storm water and the risk associated with the detention pond flooding.	KMC	Included in item 19 above	At the beginning of the operation phase
		Promote introduction of improved pit latrines in unplanned settlements and introduce construction of sewerage systems.	KMC	Part of municipal budget	At the beginning of the operation phase
		Promote education and awareness campaigns on solid waste management.	KMC	Included in item 19 above	Periodically
24	Improvement of landscape visual quality	Promote introduction of improved pit latrines in unplanned settlements and introduce construction of sewerage systems.	KMC	Part of municipal budget	At the beginning of the operation phase
		Promote education and awareness campaigns on solid waste management.	KMC	Included in item 19 above quantities for	Periodically

					other items	
	Potential Impacts		**Mitigation Measures**	**Responsibilities for implementation**	**Cost In Tshs**	**Time frame**
25	Destruction of properties due to uncontrolled storm water	Damages to nearby properties and infrastructures may occur due to not properly controlled storm water which may affect the population. Diseases may affect the population due to rain waters stagnation.	Assure clearing of all components of the storm water drainage system. Assure regular inspection of the storm water drainage system.	DMDP/PMO-RALG/DLAs	Included in item 12 &19	Annually
			Implement community sensitization programs on the risk for public health and safety caused by obstruction and destruction off storm water drains, the pollution of storm water and the risk associated with the detention ponds.			Commissioning period
			Attachment of warnings, barriers, and other precautions on all areas of potential risk.			
26	Surface and groundwater contamination	Risk of surface and ground water contamination by illegal discharges.	Ensure awareness of city dwellers to avoid waste disposal and contaminated effluents in the storm water drainage system.			Commissioning period
			Assure clearing of all components of the storm water drainage system.			Annually
			Assure regular inspection of the storm water drainage system.			
			Removal of eventual unwanted vegetation especially on embankment in the detention ponds.			Annually
			Cleaning out clogged outlet and drainage system in the detention ponds.			Annually
27	Soil contamination and landscape disturbance	Risk of soil contamination by contaminated water infiltration by illegal discharges.	Ensure the maintenance of vegetation in the detention ponds (cutting and planting). Assure clearing of all components of the storm water drainage system. Assure regular inspection of the storm water drainage system.		-----	Annually
28	Bad odour	Risk for emergence of odours affecting due to the possible contamination of storm water if uncontrolled discharges of waste water and waste disposal in the river.				

	Illegal connections and dumping of waste	Production of waste concrete, debris, iron and steel waste by surface water drainage infrastructures maintenance.	All waste produced must be collected by licenced private/municipal service providers.	DMDP/PMO-RALG/DLAs	Included in item 14	Annually
29		Production of organic materials and sediments by general clearing activities and cleaning out clogged outlet and drainage system at the detention ponds.				
		Illegal discharge of solid and liquid wastes to the channels	The Kinondoni Municipal Council shall enforce by-laws to discourage people and local industries against throwing solid and liquid wastes and discharging sewage wastes into drainage channels. This should also go in parallel with education and awareness campaigns on proper solid wastes management.			
30	Transmission of diseases	As a result of rain water stagnation	Implement community sensitization programs on the risk for public health and safety caused by obstruction and destruction of storm water drains and the risk associated with the detention pond flooding.	IMC	Included in item 19	At the beginning of the operation phase
			Assure clearing of all components of the storm water drainage system. Assure regular inspection of the storm water drainage system.	IMC	Included in item 12	Annually
31	Risk of drowning for the population	Flooding phenomenon on the detention pond may place a drowning risk especially for sensitive groups such as children and the elderly.	Attach warning signs, barriers, and other precautions on all areas of potential risk.	IMC	Included in item 18	At the beginning of the operation phase and whenever necessary (when damaged)
			Implement community sensitization programs on safety measures to be taken.	IMC	Included in item 19	At the beginning of the operation phase

(PROCESL/COWI, 2014)

CHAPTER 9.0: ENVIRONMENTAL MONITORING PLAN

Environmental Monitoring Framework for the Surface Water Drainage System in Kinondoni Municipality outlines the responsibilities of DMDP/PMO-RALG, NEMC and the Contractor to monitor the environmental and social mitigation measures of the Sub-project and to ensure it is constructed and operated in a manner that is compliant with Tanzanian's Government regulations and EIA/EMP commitments.

A monitoring regime will be established, prioritising the elements that must be in place prior to construction to allow a baseline to be established against which changes during construction and operation can be assessed. Some of the necessary monitoring aspects can be included in the on-going activities of government agencies already active in the project area. Some will be the responsibility of the contractors and some should be carried out by other responsible parties for development and operation of the project or organisations appointed by them. The monitoring programme also establishes effective feedback mechanisms so that the performance and effectiveness of the various elements of the EMP can be evaluated and, if necessary, corrective actions can be implemented. The table below outlined some major elements of the Monitoring plan for the Kinondoni Surface Water Drainage System project.

TABLE 35

MOBILIZATION MONITORING PLAN FRAMEWORK

Impact	Mitigation measure	Indicator	Location	Procedure	Verification	Duration	Objective	Responsibility	Cost estimate (USD)
Air pollution	• Vehicles carrying fine materials / particulate type must be covered during transportation; • Moderate speeds must be adopted when crossing inhabited or sensitive areas.	Dust production	Storage sites and locations where earth movements are carried	Visual observations, through supervision	Reporting	Punctual unannounced inspections during working hours	Assure compliance with legal requirements	Environmental Consultant in collaboration with Resident Engineer	1,500
	• Regular cleaning of access roads and unpaved areas to avoid the accumulation of dust either by wind or by the movement of vehicles and equipment.	Air quality (dust production) Complaints	Construction site and/or surroundings	Visual observations	Reporting forms and keeping records (complaints)	During earthworks	Assure compliance with legal requirements. Response to complaints.	Environmental Consultant in collaboration with Resident Engineer	1,500
Water pollution	• Prevent the accumulation of soil on natural drainage lines, ditches and ensure cleanliness and proper maintenance of ditches and all river extensions.	Water quality standards in construction and camp sites (BOD, pH, COD, TSS, dissolved oxygen, temperature, coliforms, etc.)	Water reserves and resources Sewage disposal sites	Water sampling Laboratory testing Keeping records	Reporting	One sample	Prevention of water pollution	Environmental Consultant in collaboration with Resident Engineer	2,000

(PROCESL/COWI, 2014)

TABLE 36

CONSTRUCTION MONITORING PLAN FRAMEWORK

Impact	Mitigation measure	Indicator	Location	Procedure	Verification	Duration	Objective	Responsibility	Cost estimate (USD)
Soil pollution	• Limit soil works within construction areas unless it is absolutely necessary; • Proceed to the immediate replacement of the soils removed in the opening trenches; • The stacking of topsoil should be kept in areas previously disturbed or plowed, clearly marked and accessible by vehicles; • The stacks must be appropriately protected against soil erosion from wind and water currents, including rainfall.	Top-soil storage Evidence of erosion phenomena	Storage sites and where earth movements are carried	Visual observations, through supervision	Reporting	Punctual unannounced inspections during working hours	Preservation of soil, water and air pollution	Environmental Consultant in collaboration with Resident Engineer	*1,000
Noise levels increment	• Noise sources shall be relocated to less sensitive areas to take advantage of distance; • Noise emissions shall comply with applicable laws in force in the country; • Limit works to daylight hours. Stop noisy construction during the night hours (18.00 – 6.00).	Noise levels Complaints	Construction site	Measurement of noise levels on equipment and machinery	Reporting forms and keeping records (complaints)	Periodic. Dependent of work stage and complaints	Assure compliance with legal requirements. Response to complaints.	Environmental Consultant in collaboration with Resident Engineer	*1,500
Air pollution	• The excavation, handling and transport of erodible materials should be avoided in windy conditions; • Vehicles carrying fine materials	Air quality (dust production) Complaints	Construction site and/or surroundings	Visual observations Reporting forms and keeping records	Reporting forms and keeping records (complaints)	During earthworks and works in dry season	Assure compliance with legal requirements. Response to	Environmental Consultant in collaboration with Resident Engineer	*1,000

Impact	Mitigation measure	Indicator	Location	Procedure	Verification	Duration	Objective	Responsibility	Cost estimate (USD)
	must be covered during transportation; • Regular cleaning of access roads and unpaved areas.			(complaints)			complaints.		
Water pollution	• Should not be permitted the flow of muddy water or perform uncontrolled discharges from the work areas (including washing) for the adjacent water courses and/or water bodies; • All construction activities that could endanger the water quality of receiving rivers should be avoided and controlled through site planning of construction activities and the preparation of a site procedures protocol; • The water containing pollutants such as cement, concrete, lime, chemicals and fuels must be discharged into a temporal tank for a later removal from the site.	Water quality standards in construction and camp sites (BOD, pH, COD, TSS, dissolved oxygen, temperature, coliforms, etc.)	Water reserves and resources Sewage disposal sites	Water sampling Laboratory testing Keeping records	Reporting	Monthly testing for TSS, DO, conductivity and pH (using portable equipment) Monthly testing other parameters	Prevention of water pollution	Environmental Consultant in collaboration with Resident Engineer	---
Waste production	• The deliberate disposal of wastes must be forbidden in the banks and beds of water lines; • All wastes produced must be collected by licensed private/municipal service providers; • All wastes produced must be collected and disposed in appropriate manner;	Quantities and types of waste produced	Construction sites and temporary warehouses	Visual observations Counting the quantity of waste produced and stored	Reporting Keeping records of time, dates and quantity of waste produced and stored	Monthly	Control waste production and management	Environmental Consultant in collaboration with Resident Engineer	*2,000

Impact	Mitigation measure	Indicator	Location	Procedure	Verification	Duration	Objective	Responsibility	Cost estimate (USD)
	• Construction sites and temporary warehouses should be cleaned to prevent indiscriminate fires, burial or abandonment of waste.								
Impacts on cultural heritage	• The discovery of any tombs, archaeological or cultural elements previously unidentified during the clean-up must be notified to the authority immediately (if any); • Construction works must be stopped to allow site investigation and approval process; • The Project construction must be done with appropriate respect for sites of cultural and religious significance.	Accidental discovery of culturally significant artefact or site	Excavation sites	Visual observations	Reporting	During excavation	Preservation of cultural heritage	Environmental Consultant in collaboration with Resident Engineer	*2,000
Equipment maintenance facilities and fuelling	• Fuelling of machinery and vehicles as well as equipment maintenance should be done in concrete floors previously identified within the site.	Oil spills marks		Visual observations	Reporting	Periodic	Preservation of soil Prevention of water pollution	Environmental Consultant in collaboration with Resident Engineer	---
Disruption of services	• The interruption of services (water, telephone, electricity etc..) should be minimized through a careful planning, close supervision and a continuous community information program; • The interruption of services must be notified to the community beforehand;	Relocation of utilities Complaints	Construction site Adjacent communes	Visual observations	Reporting forms and keeping records (complaints)	Once during construction phase	Minimize the disruption of service interruption	Environmental Consultant in collaboration with Resident Engineer	*10,000

Impact	Mitigation measure	Indicator	Location	Procedure	Verification	Duration	Objective	Responsibility	Cost estimate (USD)
	• The need for temporary site drainage during the construction phase should be considered; • Notify in advance the competent authorities about the interruption of roads, water supply or energy.								

(PROCESL/COWI, 2014)

TABLE 37

OPERATION MONITORING PLAN FRAMEWORK

Impact	Mitigation measure	Indicator	Location	Procedure	Verification	Duration	Objective	Responsibility	Cost estimate (USD)
Water pollution	• Awareness of city dwellers to avoid waste disposal and contaminated effluents in the storm water drainage system.	Water quality standards in construction and camp sites (BOD, pH, COD, TSS, dissolved oxygen, temperature, coliforms, etc.)	Storm water drainage system	Water sampling Laboratory testing	Monthly reporting	Monthly	Prevention of water pollution	DMDP/PMO-RALG/KMC	5,000
landscape disturbance	• Maintenance of vegetation (cutting and planting).	Vegetation	Re-vegetated areas	Inspection	Reporting	Periodic	Prevention of soil erosion Protection of Fauna and Flora	DMDP/PMO-RALG/KMC	*1,000
Disruption of natural drainage network	• Clearing of all components of the storm water drainage system including cleaning out clogged outlet and	Cleaning Evidence	Detention ponds	Inspection	Reporting	After each heavy storm events	Evaluation of the operation	DMDP/PMO-RALG/KMC	*2,500

Impact	Mitigation measure	Indicator	Location	Procedure	Verification	Duration	Objective	Responsibility	Cost estimate (USD)
	drainage system.								
	• Removal and properly disposal of the accumulated sediments in the detention ponds.	Sediments presence	Detention ponds	Removal and properly disposal of the accumulated sediments	Reporting	After a heavy storm event or every two years	Ensure the efficient operation of detention ponds	DMDP/PMO-RALG/KMC	
	• Removal of eventual unwanted vegetation especially on embankment (when applicable) in the detention ponds.	Vegetation presence	Detention ponds	Removal of eventual unwanted vegetation especially on embankment	Reporting	Periodic	Ensure the efficient operation of detention ponds	DMDP/PMO-RALG/KMC	

(PROCESL/COWI, 2014)

* = consultant estimates

CHAPTER 10.0: COST BENEFIT ANALYSES

10.1 DEFINING NVP AND IRR

OBJECTIVE AND METHODOLOGY

The objective of the economic feasibility assessment is to establish a Cost-benefit analysis (CBA) and estimate the profit of the sub-project for society by render comparable all the costs and benefits of the sub-project.

The approach adopted to perform the Cost-benefit analysis (CBA) of the sub-project comprises four steps:

1. Risk analysis;
2. Benefits valuation;
3. Economic efficiency;
4. Sensitivity analysis.

Risk analysis

The risk associated to a flood event is analysed as a function of hazard and vulnerability wherein:

- Hazard corresponds to the intensity and recurrence of flooding (and it's presented through the estimated flooded area for each rainfall event and the correspondent annual probability of an event not exceeding – exceedance probability);
- Vulnerability expresses the combination of the relevant elements (population and assets associated with a certain flood intensity and recurrence) with their susceptibility to damage (fragility) and resilience (denoted as the ability to return to pre-disaster conditions).Vulnerability is presented through the combination of damage ratio and the amount of exposure per period of return.

Benefits

The benefits of the sub-project arise due to the savings in terms of avoided costs and correspond to the risk reduction introduced by the sub-project.

Only the following non-monetary benefits were valuated:

- Increase in land price;
- Prevention of physical damages to properties;
- Direct assistance/care costs;
- Loss of income/wages/goods;

- Cleanliness/restoration costs.

The Cost-benefit analysis didn't account for non-monetizable benefits (for example health benefits), and non-quantifiable benefits (for instance civil pride and happiness) due to estimation problems.

The establishment of a loss-frequency relation, for the cases with and without sub-project, enables to calculate expected damages per period of return and the annual expected extent of damages.

Based on the loss and loss reduction estimates, net benefits (the difference between damages and reduced damages) can be calculated.

Economic efficiency

The economic efficiency of the sub-project is based on the calculation of the net present value (NPV), benefit/costs ratio (B/C), and interest rate of return (IRR).

To discount future values is used a 12% discount rate and it's assumed that the sub-project will have a 25 years lifetime with a construction period of 2 years. The investment costs are considered to be equally divided by the first two years. It's assumed that there would be no protection against flooding in the first two years and thus no benefits before each structure is finished. It's also assumed that maintenance would start only at year 3 and maintain a constant value equal to 1% of initial investment.

The estimated annual benefits of the sub-project will increase due to assumed increases in exposure by 1 % annually as expected increases in exposed population and assets are accounted for. Thus, the benefits in terms of avoided damages to the exposed assets are increasing over time from year 3 to year 27 as more assets and population are put at risk.

The discounted expected benefits lead to the net present value of the sub-project. The net benefits are increasing over time, but on the other hand, due to discounting, discounted net benefits are decreasing over time.

Sensitivity analysis

Sensitivity analysis is conducted using the following sensitivity checks:

1. Increasing costs ad-hoc by 30%;
2. Decreasing benefits referent to changes in land value by 30%.
3. Decreasing property exposure by 25%;
4. Combining all previous scenarios in one unique scenario

COST OF CONSTRUCTION

The following table summarises the construction costs of the proposed infrastructure/ components for the Sinza River proposed solution. The estimated costs are presented excluding the costs of demolition of houses and people resettlement as a sub total base construction cost with the supervision construction and contingency in grand total.

Contingencies and other costs, with a rate between 20-25% of the total construction costs, include the environmental management and mitigation measures

TABLE 38

CONSTRUCTION COSTS

Item	Unit	KI1 - Sinza River		
		Quantity	Rate	Cost (1,000 USD)
General and preparatory works				1000
Construction of detention pond with V=65,000 m³	un	---	---	742
Construction of detention pond with V=40,000 m³	un	---	---	568
Construction of marginal concrete walls	m	1,100	800	880
Enlarging trapezoidal open channel to D2.5m; B9.0m	m	3,825	1,900	7,267.5
Enlarging trapezoidal open channel to D2.5m; B13.0m	m	2,285	2,000	4,570.0
Enlarging trapezoidal open channel to D2.5m; B14.25m	m	370	2,050	758.5
Enlarging trapezoidal open channel to D2.7m; B16.00m	m	215	2,150	462.3
Extra box culvert at Shekilango Road	m²	42	1,500	63
Enlargement of Ally Maya Road crossing (box culverts)	m²	120	1,500	180
Enlargement of Kajenge Road crossing (box culverts)	m²	120	1,500	180
Enlargement of one minor road crossing (box culverts)	m²	120	1,500	180
Final outlet	un	1	250,000	250
Construction/enlargement of concrete pedestrian crossings	un	12	10,800	129,6
Construction of lateral drainage	m	6,000	400	2.400
Temporary barriers for isolating part of the river cross section	un	---	---	100
Others				400
SUB TOTAL BASE COST				**20,131**
Supervision Cost (5%)				1007
Physical Contingencies (7.5%)				1585
Contingencies Cost (7.5%)				1704
GRAND TOTAL COST				**24,427**

(PROCESL/COWI, 2014)

NVP AND IRR

The economic efficiency of the sub-project is based on the calculation of the Net Present Value (NPV), Benefit/Costs ratio (B/C), and Interest Rate of Return (IRR).

To discount future values is used a 12% discount rate and it's assumed that the sub-project will have a 25 years lifetime with a construction period of 2 years. In the first two years of the sub-project, there would be investment costs of 21.0 million USD (equally divided by the first two years). It's assumed that there would be no protection against flooding in the first two years and thus no benefits before the structure was finished. It's also assumed that maintenance would start only at year 3 and maintain a constant value equal to 1% of initial investment.

The estimated annual benefits of 5.2 million USD will increase due to assumed increases in exposure by 1 % annually as expected increases in exposed population and assets are accounted for. Thus, the benefits in terms of avoided damages to the exposed assets are increasing over time from 5,2 in year 3 to 6,6 million USD in year 27 as more assets and population are put at risk.

The discounted expected benefits lead to a NPV of 15.5 million USD over the whole lifetime of the project. Thus, net benefits are increasing over time, but on the other hand, due to discounting, discounted net benefits are decreasing over time.

The correspondent benefit/costs ratio is 1.8 and the IRR is 22.1%.

TABLE 39

CALCULATION OF NET PRESENT VALUE OF THE PROJECT

Year	Costs	Benefits	Net Benefits	Discounted costs	Discounted benefits	Discounted Net Benefits
1	10,500	0	-10,500	9,375	0	-9,375
2	10,500	0	-10,500	8,371	0	-8,371
3	210	5,160	4,950	149	3,673	3,523
4	210	5,212	5,002	133	3,312	3,179
5	210	5,264	5,054	119	2,987	2,868
6	210	5,317	5,107	106	2,694	2,587
7	210	5,370	5,160	95	2,429	2,334
8	210	5,423	5,213	85	2,190	2,106
9	210	5,478	5,268	76	1,975	1,900
10	210	5,532	5,322	68	1,781	1,714
11	210	5,588	5,378	60	1,606	1,546
12	210	5,644	5,434	54	1,449	1,395
13	210	5,700	5,490	48	1,306	1,258
14	210	5,757	5,547	43	1,178	1,135

Year	Costs	Benefits	Net Benefits	Discounted costs	Discounted benefits	Discounted Net Benefits
15	210	5,815	5,605	38	1,062	1,024
16	210	5,873	5,663	34	958	924
17	210	5,931	5,721	31	864	833
18	210	5,991	5,781	27	779	752
19	210	6,051	5,841	24	703	678
20	210	6,111	5,901	22	634	612
21	210	6,172	5,962	19	571	552
22	210	6,234	6,024	17	515	498
23	210	6,296	6,086	15	465	449
24	210	6,359	6,149	14	419	405
25	210	6,423	6,213	12	378	365
26	210	6,487	6,277	11	341	330
27	210	6,552	6,342	10	307	297
NPV						**15,517**

(PROCESL/COWI, 2014)

10.1 RESULTS OF COST BENEFIT ANALYSIS (CBA)

The previous efficiency calculations establish the basis for the sensitivity analysis: NPV of 15.5 million USD, B/C ratio of 1.8 (34.6/19.1 million USD) and IRR of 22.1%. As mentioned, there are a number of uncertainty factors relating to data, future changes and also concerning the appropriate discount rate to use. Thus, it is important to conduct sensitivity analysis to check the effects on results. The following sensitivity checks were done:

1. Increasing costs ad-hoc by 30% (from 21.0 to 27.3 million USD);
2. Decreasing benefits referent to changes in land value by 30% (change of the average land price from 50,000 USD/ha to 35,000 USD/ha);
3. Decreasing property exposure by 25%;
4. Combining all previous scenarios in one unique scenario.

Efficiency decreases in all scenarios, particularly so for the case where all scenarios are combined (i.e. increasing costs ad-hoc by 30%, decreasing benefits referent to changes in land value by 30%, and decreasing property exposure by 25% all at the same time). A range of 1.0 to 14.3 million USD for the NPV was computed for the different scenarios, thus even for the worst scenario there would still be a positive social return on this sub-project.

The present intervention has Economic Feasibility with an IRR from 22.1% to 12.6% (see **TABLE 40**).

TABLE 40

SENSITIVITY ANALYSIS

	Baseline Scenario	Costs ↗ 30%	Land Benefits ↘ 30%	Property Exposure ↘25%	Extreme Scenario
	(0)	(1)	(2)	(3)	(1)+(2)+(3)
NPV (millions USD)	15.5	9.8	14.3	8.0	1.0
B/C (No.)	1.8	1.4	1.8	1.4	1.0
IRR (%)	22.1%	17.1%	21.4%	17.4%	12.6%

(PROCESL/COWI, 2014)

CHAPTER 11.0: DECOMISSIONING

The Sub-project, which addresses the rehabilitation of storm water drainage in conjunction with the improvement of Mto Ng'ombe (Sinza River) and construction of two sequential detention ponds, is expected to be a permanent feature not to be decommissioned but rather to be regularly maintained as the need for surface water drainage is essential to prevent flooding events. The infrastructure will continue to have a passive influence on the environment and will be benign, so will not degrade or pollute the environment.

However, if the unlikely happens, it is to consider that decommissioning of drainage structures comprises dismantling, shipment and final disposal of materials as well as site cleaning and rehabilitation. The site shall be left in safe and environmentally acceptable conditions.

Under these circumstances, it will be necessary to hire workers for structures removal. Decommissioning activities will also result into generation of wastes from obsolete materials and unwanted materials. Mechanisms of identifying, collecting and disposal shall be in place to ensure all wastes have been collected, removed and right disposed of. Areas disturbed by removal of structures shall be re-vegetated with grass and appropriate tree species.

It is also important that PMO-RALG through the life span of the project establishes a monitoring programme for the environment and the findings of these studies be included in the audit reports that would feed into a decommissioning plan, in necessary.

CHAPTER 12.0: SUMMARY AND CONCLUSION

The actual surface water system in Kinondoni Municipality is already resulting into environmental health hazards to the local residents, especially the vulnerable poor section of the community living in unplanned settlements. The problem of frequent flooding events will also continue to damage the existing infrastructure and utilities, hence perpetuating poverty in the area, if protective measures are not taken.

The proposed Surface Water Drainage System Sub-project in Kinondoni Municipality aims at improving the current drainage system in the municipality providing a better welfare for the population.

Although this Sub-project might have some potential negative impacts as mentioned in the present Environmental Impact Assessment (EIA) Report, such as land acquisition and/or involuntary resettlement, it is our beliefs that it will have more significant positive impacts, truly important for the municipality.

This project will create temporary employment, will provide opportunities to local businesses, will create better facilities for those who will be relocated in terms of drainage, water supply, housing, etc. and, far more important, it will bring local and regional benefits as a result of the upgrading of the storm Water Drainage System with a significant improvement in the quality of public health.

Furthermore, project implementation will also contribute to the reduction of soil erosion, as well as the visual and aesthetic appearance of the urban landscape of Kinondoni Municipality.

Considering that the EIA Report constitutes a valid decision support for the feasibility of the Project, identifying the main changes that will be felt on the various environmental components analysed, it is believed that if the mitigation measures recommended in this Report are implemented, there will be no environmental constrains to the Sub-Project implementation as it is designed and envisaged to occur since the long-term benefits of project implementation outweigh the generally short-term adverse impacts associated with mobilization, construction and operation phases, all of which can be mitigated satisfactorily.

Like in all stages of Dar es Salaam Metropolitan Development Project (DMDP) it will be important to involve all stakeholders in the next stages, not only to get comments and suggestions about the identified impacts, but also to integrate recommendations and feasible mitigation measures.

Finally, to achieve the objectives set by the Sub-project it is recommended to implement the management actions described in the Environmental Management Plan (EMP) as well as mitigate measures proposed along the EIA Report.

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CHAPTER 14.0: APPENDIX

14.1 TERMS OF REFERENCE

Introduction

These Terms of Reference (TOR) outline the scope of work to be carried out in preparation of the Environmental Impact Assessment (EIA) and an Environmental Management Plan (EMP) for Intervention KI 1(a): Rehabilitation of Storm Water Drainage at Mto Ng'ombe (Sinza River).

Objectives

The main objective of undertaking Environmental Impact Assessment for Rehabilitation of Storm Water Drainage at Mto Ng'ombe is to provide baseline data/information and to determine the likely potential environmental impacts associated with the project and provide mitigation measures prior to implementation of the proposed project.

Project activities are included in the mandatory list of the projects that are required to develop full EIA by the Environmental Management Act No. 20 of 2004. Part IV of EIA regulations G.N. 349 of 2005 provides the general objectives for carrying out EIA, among others list comprises the following:

- To ensure that environmental considerations are explicitly addressed and incorporated into the development decision making process;
- To anticipate and avoid, minimize or offset the adverse significant biophysical, social and relevant effects of development proposal;
- To protect the productivity and capacity of natural ecosystems and ecological processes which maintain their functions;
- To promote development that is sustainable and optimizes resource use and management opportunities.

Specifically the consultant shall:

1. Carry out the Environmental Assessment works;
2. Prepare the Environmental Management Plan;
3. Prepare final reports of Environmental Impact Assessment and Environmental Management Plan as per World Bank and NEMC standards;
4. At all times to meet the Lead Consultant's requirement regarding programme of work, report submission and completion of tender documents assigned on;
5. Carry out necessary environmental works related to the project as instructed by the Lead Consultant.

EIA Requirements

Regulations and guidelines that will govern the conduct of the assessment of the study will include the following: (i) National laws and/or regulations on environmental assessment; (ii) Regional, provincial or communal environmental assessment regulations; and World Bank Operational Policy 4.01: "Environmental Assessment" and other pertinent environmental/social safeguard policies, e.g., resettlement; and (iii) Relevant international environmental agreements/conventions to which the country is a party.

Scope of work

The consultant shall carry out all necessary tasks provided in this ToR. In cases, where information deficiencies need to be identified and resolved or specialized field studies performed to assess impacts, the consultant should define such particular tasks in more detail for the contracting agency's review and approval.

The consultant's tasks shall include but not necessarily limited to the following:

- Identify, evaluate and mitigate the significant environmental impacts (positive and negative);
- Identify key social issues relevant to the project objectives, and specify the project's social development outcomes;
- Determine magnitude of adverse environmental and social impacts and identify safeguards instruments as per the World Bank's Operational Policies, Country Laws and Regulations;
- Assess the impacts on any cultural resources to ensure that the investment designs meet the guidelines set out in the Bank's OP 4.11 Physical Cultural Resources;
- Predict and assess in quantitative terms as far as possible, the impact from changes brought about by the project on the baseline environmental conditions;
- Establish the mitigation measures that are necessary to avoid, minimize or offset predicted adverse impact and, where appropriate incorporate these into the Environmental Management Plan (EMP);
- Identify key stakeholders who are directly affected and carry out stakeholder analysis to determine their role in achieving social development outcomes;
- Inform, consult and carry out dialogues with stakeholders on matters regarding the project design alternatives, implementation of environmental and social mitigation measures, and provide specific recommendations on project design that may require adjustments in project design;
- Provide an environmental and socio-economic profile of the population and available infrastructure facilities for services and community resources;

- Assess the capacity of the implementing agencies and mechanisms for implementing safeguard instruments, and recommend capacity building;
- Develop monitoring and evaluation mechanism to assess effectiveness of mitigation measures including, resettlement outcomes during and after project implementation;
- Prepare a RAP.

The EMP will be a compilation of information gathered through Environmental Impact Assessments (ESIAs) carried out for all sub-projects to be implemented through Component 1(a) of the DMDP. The EMP will be carried out in accordance with the World Bank's Operational Policy for Environmental Assessment (OP 4.01). The Environmental Management Plan to be prepared by the Consultant under the assignment includes: (1) Environmental Overview Report for the DLA; (2) Environmental Management Plans for each sub-project proposed by the DLA, to be an integral part of the consolidated final DLA sub-projects investment proposal document and; (3) the Environmental Impact Assessment Section prepared for the DLA for incorporation in the Overall Operational Manual for the DMDP. An executive summary synthesizing the process and incorporating the findings from the above reports will also need to be prepared.

Report Layout

Provide an EIA report that is concise and limited to significant environmental and social issues. The main text should focus on findings, conclusions and recommended actions, supported by summaries of the data collected and citations for any references used in interpreting those data. The EIA report should provide the following (i) Executive Summary; (ii) Introduction; (iii) Project Description; (iv) Relevant Policy, legal and institutional framework; (v) Environmental and socio-economic baseline conditions; (vi) Stakeholder identification and methods of participation; (vii) Impact identification and assessment of alternatives; (viii) Mitigation and enhancement measures; (ix) Environmental Management Plan; (x) Cost Benefit Analysis; (xi) Decommissioning; (xii) Summary and conclusions; and (xiii) References.

Consultant Qualifications and Experience

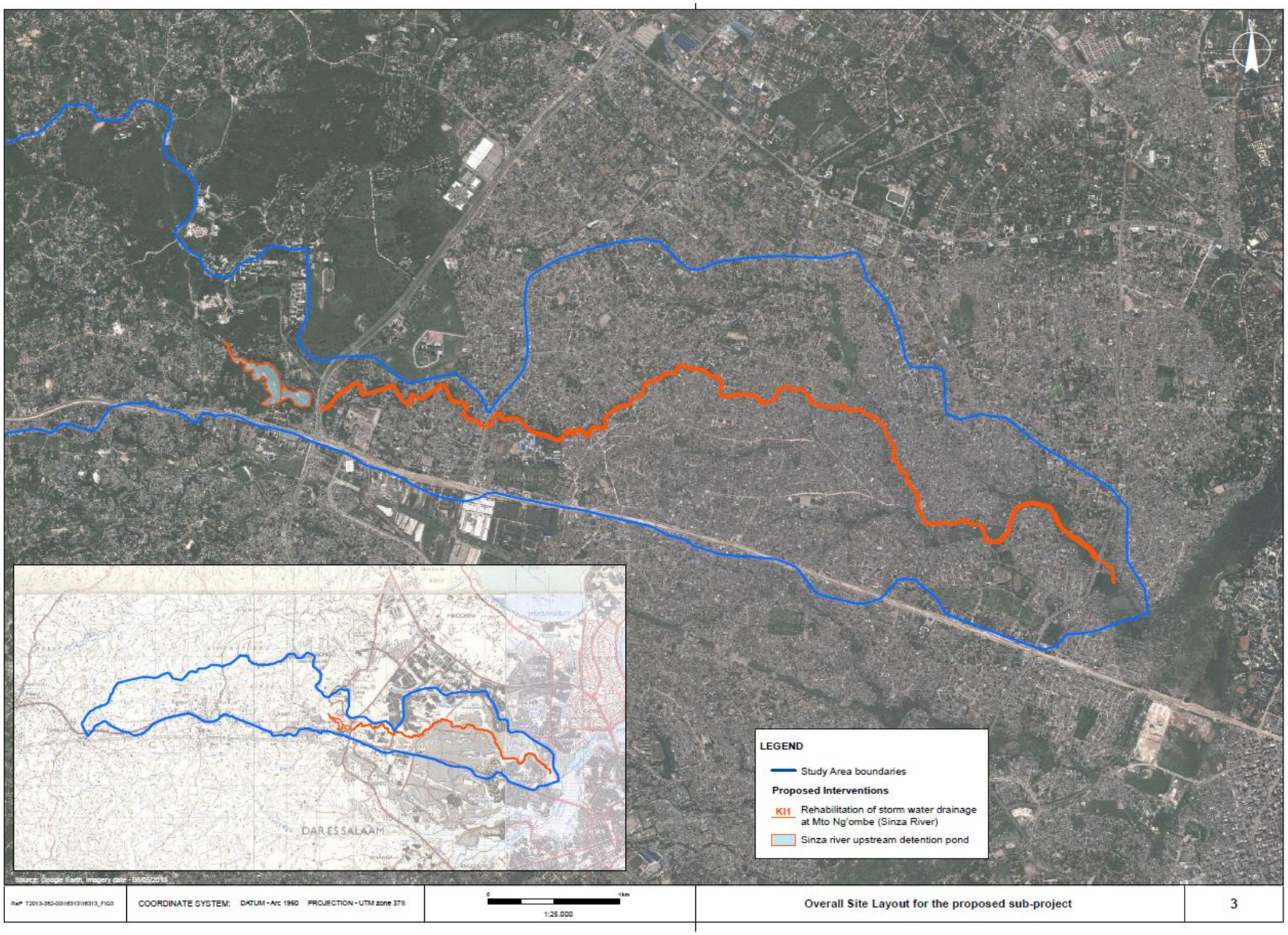
The individual consultant for conducting the assignment should have the following qualifications: (1) At least MSc. in Environmental Management, Environmental Planning or related field; (2) Sound knowledge of social aspects; (3) a proven ability for undertaking environmental and social assessments; (4) Proven skills for communication and working with the community; (5) Demonstrated understanding, knowledge and experience from undertaking environmental and social assessments; (6) Knowledge and experience on World Bank Environmental and Social Safeguard Policies; (7) At least 5 year experience of conduct similar assignments; (8) Registered by

the National Environment Management Council in accordance to the EIA and Audit Regulations of 2005.

14.2 MINUTES OF MEETINGS AT WARD LEVEL

14.3 SIGNATURES OF STAKEHOLDERS COLSULTED

14.4 PROJECT LAYOUT



14.5 ADOPTED SOLUTIONS

14.6 LOCATION AND DEFINITION OF PROPOSED INTERVENTIONS – KINONDONI COUNCIL

14.7 RESETTLEMENT SUMMARY

		Acquired building/ structure	Acquired Land	Crops value	Allowances				Total Cost
Mtaa	**No af affected Households**				**Accommodation**	**Transport**	**Loss of profit**	**Disturbance**	**TZS**
sinza D&E	**24**	**213,813,986.00**	**83,973,750.00**	**6,060,966.00**	**26,460,000.00**	**-**	**-**	**27,030,172.40**	**357,338,874.40**
Ali Maua A&B	**64**	**465,265,765.00**	**108,589,200.00**	**4,841,007.53**	**100,080,000.00**	**3,900,000.00**	**-**	**46,342,333.80**	**729,018,306.33**
Mbuyuni	17	104,324,653.60	32,836,500.00	1,844,991.00	33,660,000.00	1,200,000.00	-	11,120,491.57	184,986,636.17
Kisiwani	101	728,948,697.50	295,388,940.00	12,159,177.03	178,560,000.00	9,900,000.00	3,153,600.00	82,826,171.01	1,310,936,585.54
Mchangani	3	-	10,710,000.00	1,485,262.08	-	-	-	975,620.97	13,170,883.04
	121	**833,273,351.10**	**338,935,440.00**	**15,489,430.11**	**212,220,000.00**	**11,100,000.00**	**3,153,600.00**	**94,922,283.54**	**1,509,094,104.75**
Mwinjuma	**6**	**-**	**12,168,000.00**	**2,792,727.92**	**-**	**-**	**1,728,000.00**	**1,196,858.23**	**17,885,586.15**
Hananasif&mkunguni	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-**
Chakula bora	13	53,131,695	15,369,450	1,699,278	9,900,000	300,000	648,000	5,616,034	86,664,457.32
Uzuri	2	-	2,394,000	564,000	-	-	-	236,640	3,194,640.00
Kilimani	12	49,470,918	33,102,900	2,212,898	12,960,000	600,000	-	6,353,697	104,700,413.07
	27	**102,602,613.00**	**50,866,350.00**	**4,476,176.24**	**22,860,000.00**	**900,000.00**	**648,000.00**	**12,206,371.14**	**194,559,510.38**
Urafiki/national housing	**4**	**25,590,920**	**13,526,821**	**1,127,966**	**4,320,000**	**300,000**	**-**	**2,268,756**	**47,134,463.71**
Mtogole &Mkunduge	**75**	**449,522,216.30**	**139,196,850.00**	**7,085,736.92**	**98,280,000.00**	**5,700,000.00**	**-**	**47,619,675.68**	747,404,478.90
Makanya	8	154,052,747.00	44,052,600.00	1,567,522.66	29,880,000.00	1,800,000.00	-	15,973,829.57	247,326,699.24
Vigaeni	25	225,092,510.63	92,155,500.00	5,827,944.34	50,220,000.00	3,300,000.00	2,890,080.00	25,846,076.40	405,332,111.36
	33	**379,145,257.63**	**136,208,100.00**	**7,395,467.00**	**80,100,000.00**	**5,100,000.00**	**2,890,080.00**	**41,819,905.97**	**652,658,810.60**
Makuti,Idrisa&Suna	**34**	**101,623,146.00**	**66,901,500.00**	**14,989,699.39**	**17,100,000.00**	**900,000.00**	**5,486,400.00**	**14,681,147.63**	**221,681,893.02**
	388.00	**2,570,837,255.03**	**950,366,011.38**	**64,259,177.62**	**561,420,000.00**	**27,900,000.00**	**13,906,080.00**	**288,087,504.23**	**4,476,776,028.25**