UNITED REPUBLIC OF TANZANIA

PRIME MINISTER'S OFFICE

REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

Tanzania Strategic Cities Project (TSCP)
3rd & 4Th Floor Millennium Towers Building
Ali Hassan Mwinyi Rd.
P.O. Box 34314
Dar es Salaam

Telephone: 255 (22) 2700764/65/69
Fax: 255(22)2700768
Email Address: cities.project@yahoo.com

TANZANIA STRATEGIC CITIES PROJECT (TSCP)

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

TENDER N.° ME/022/2011/2012/C/12

REPORT

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Submitted to:
National Environment Management Council
Regent Estate, Mikocheni,
P. O. Box 63154, Dar es Salaam.
Tel: +255 22 2774852/ 0713608930;
Fax: +255 22 2774901
E-mail:nemc@nemctz.org

Prepared by:
COWI Tanzania Limited
in Association with
PROCESL
Plot No. 398 Mwai Kibaki Road, P.O. Box 1007
Dar es Salaam, Tanzania
Tel: +255 222 666 161;
Fax: +255 222 666 094
E-mail: cowi@cowi.co.tz

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DECLARATION

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

1. Mr Alex Ng'asi, Environmental Impact Assessment Specialist, COWI

……

2. Miss Rita Bento, Environmental Impact Assessment Specialist, PROCESL

……..

ACKNOWLEDGEMENT

The Prime Minister's Office - Regional Administration and Local Government (PMO-RALG), the Project Proponent, would like to extend sincere gratitude to all individuals and institutions who contributed to the completion of the following tasks under the proposed Tanzania Strategic Cities Project: the provision of consultancy services for the improvement of surface water drainage systems in Dar es Salaam Metropolitan area, including preparation of preliminary and detailed engineering designs; cost estimates and bidding documents; and Environmental Impact Assessments for the investment sub-projects. Special thanks are due to the management and staff of Ilala Municipal Council, Wami/Ruvu River Basin Office, Water and Sewerage Authority (DAWASA), Ward Executive Officers and Village Leaders for providing valuable information and support.

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

ABBREVIATIONS

ARMCBP	Air Quality Monitoring Capacity Building Project
BP	Bank Procedures
CDA	Capital Development Authority
CBD	Central Business District
CBO	Community-Based Organisations
DAWASCO	Dar es Salaam Water and Sewerage Corporation
DAWASA	Dar es Salaam Water and Sewerage Authority
DCC	Dar es Salaam City Council
DLA	Dar es Salaam Local Authorities
DMDP	Dar es Salaam Metropolitan Development Project (DMDP)
DP	Decommissioning Plan
EC	Electric Conductivity
EWURA	Energy and Water Utilities Regulatory Authority
EHS	Environment, Heath, and Safety
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMA	Environmental Management Act
EMP	Environmental Management Plan
EIA	Environmental Impact Assessment
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
IAP	Interested and Affected Parties
IFC	International Finance Corporation
IMC	Ilala Municipal Council
KMC	Kinondoni Municipal Council
LGA	Local Government Authorities
NEMC	National Environment Management Council
NEP	National Environmental Policy
NGO	Non-Governmental Organisations
OP	Operational Policy
PMO-RALG	Prime Minister's Office – Regional Administration and Local Government
RAP	Resettlement Action Plan
SADCC	Southern African Development Coordination Conference
TANESCO	Tanzania National Electric Supply Company
TANROADS	Tanzania National Roads Agency

TBS	Tanzania Bureau of Standards
ToR	Terms of Reference
TSCP	Tanzania Strategic Cities Project
TDS	Total Dissolved Solids
UDA	Usafiri Dar es Salaam
WB	World Bank
WHO	World Health Organization

EXECUTIVE SUMMARY

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

Proponent:

United Republic of Tanzania
Prime Minister's Office - Regional Administration and Local Government (PMO-RALG)
P.O.BOX 1923
Dar es Salaam, Tanzania

EIA expert:

M/s COWI Tanzania Limited in Association with PROCESL
Plot No. 398 Mwai Kibaki Road, P.O. Box 1007
Dar es Salaam, Tanzania
Tel: +255 222 666 161;
Fax: +255 222 666 094
E-mail: cowi@cowi.co.tz

i. A brief description of the project environment

The main objectives of the proposed interventions for Ilala Municipality are to:

- Avoid the accumulation of storm water in existing lower areas with no natural way out or with drainage infrastructures with insufficient capacity of transport;
- Service some areas with drainage infrastructure while preventing the storm water from running along the roads/paths and hampering people's and vehicles' accessibility in the process.

Project Components

The improvement of the storm water system in Ilala Municipality will involve the following proposed interventions:

- Improvement and rehabilitation of the existing storm water drains at Mtambani/Food Security
- Improvement and rehabilitation of the existing storm water drains at Buguruni Kisiwani
- Improvement and rehabilitation of the existing storm water drains at Minazi Mirefu

- Improvement and rehabilitation of the existing storm water drains at Msimbazi, Tenge and Luwiti subdivisions
- Improvement and rehabilitation of the existing storm water drains at Tembo Mgwaza
- Improvement and rehabilitation of the existing storm water drains at Bonde la Sungura
- Improvement and rehabilitation of the existing Mafuriko drain
- Construction of Mpogo detention pond

Materials

The rehabilitation of the storm water system in Ilala Municipality will require the following construction materials: concrete; precast concrete slabs; stone masonry; glass fiber; plastic; iron; water; soil earth materials, gravel and sand; vegetation; oil; timber; and glass.

All materials will be sourced locally. The proposed material to be adopted in the design of the storm water pipes and frames is concrete (simple or precast, function of the existing external loads) because it is able to withstand the abrasive effect of the suspended solids in the storm water.

Pipes will be internally lined with an appropriate coating to combat chemical attacks in areas where pipes are expected/ to be used as a combined network (i.e. for both storm water and waste water). Following enlargement/rising in open channel sections, the construction of a structure with vertical walls and concrete banks and bed was assumed.

Biophysical Characteristics

Geology: 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 consist of less consolidated terrace sands and sandstones and recent alluvium.

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

Hydrology and water resources: Msimbazi River basin has a length of approximately 60 km and a basin area of 240 km^2 and Yombo River has a basin area of 24,9 km^2. Like the rest of Dar es Salaam city, rainfall in the Msimbazi River catchment comes in two seasons: March – June and October – December, and the annual rainfall ranges between 1,000 and 1,200 mm.

Water quality: Yombo River is heavily polluted by industrial wastewater discharges from industries located to the north of the informal settlements. Much of the lead contamination is traffic related, with a strong correlation between average traffic density and soil lead levels.

Water supply and sanitation: Along Yombo basin, only small areas of the Mwembeladu and Sandali sub-wards have piped utility water. The supply has been unreliable for a long time and is only available during the night twice a week. Rainwater harvesting is practiced but because of inadequate storage facilities not much water is stored.

Ecological and Environmental Characteristics

Flora: The landscape of the area is characterized by flat relief with few open spaces since the area is densely populated, extending significantly into surrounding areas, in an incoherent pattern.

Fauna: The main fauna found in the project area include domestic animals and some wildlife. These are predominantly generalist species and tolerant of human presence. Examples include house rats (*Rattus rattus*), common toads (*Amietophrynus gutturalis*), crows and sparrows. In summary, it can be said that the Sub-projects area have no remarkable wildlife resources.

ii. Stakeholders Identification and Methods of Participation

The consultations that were conducted aimed at raising issues that are likely to be of interest to the client, developer, communities, and concerned stakeholders. During the preliminary stage of this Project, several stakeholders were consulted in February 2013, 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. 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 with the stakeholders involved. Those who attended include representatives from PMO-RALG, World Bank, and those from the ministries and municipalities involved. The third and the fourth consultations were conducted between October 2013 and April 2014. The stakeholders consulted are listed in the table below.

TABELA A

STAKEHOLDERS CONSULTED

Name	Institution	Jurisdiction Area	Position
Eng. Ignace A. J. Mchallo l	National Environmental Management Council	Nationwide	Director of Environmental Impact Assessment Department Eng.
Eng. Linus Shao	Ministry of Lands, Housing and Human Settings	Physical Planning Division Settlement	

Name	Institution	Jurisdiction Area	Position
	Development	Regularization Section	
	DAWASA – Dar e Salaam Water and Sewage Authority	Dar es Salaam Region	Engineer responsible for the sewage
Fadhili Eliahr	DAWASCO	Ilala	Area Engineer
Ogare Salu	Municipal Council	Ilala	Municipal Engineer
Kasim M.K.	Municipal Council	Ilala	Road Engineer
Ward Executive Officers	Local Government	Ilala	WEO
Local People	Communities	Ilala	Community Members
Eng. Chacha Haroun	Local Government	Ilala	DMDP Coordinator
Mathias Mlagambwa	DAWASA	Dar es Salaam Area	Engineer

Some of the major issues raised during the consultations include:

- Limited capacity of power supply
- Costs of moving/relocating infrastructure facilities
- Vandalism, theft and sabotage
- Water leaks from main water supply pipes
- Increasing water demand
- Corporation with other utility agencies
- Few/limited infrastructure facilities
- Sewerage blockade
- Limited land space to develop infrastructure in unplanned settlements
- Enhance waste collection points
- Land and property compensation
- The need for spatial planning

iii. Description of Major Significant Impacts

The major environmental and social impacts identified include the following:

a. 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.

b. 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.

c. 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.

d. 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 Ilala Municipality and the detention pond. 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.

e. 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 pond, especially sensitive groups such as children and elderly.

iv. 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 for impacts. The impacts and their respective proposed mitigation measures are listed below:

a. Improved quality of public health

- Implement community sensitization programs concerning the risks to public health and safety
- Introduce education and awareness campaigns on solid waste management
- Promote the 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

- Maintain natural flow regimes by implementing alternative and temporary drainage whenever necessary
- Minimize the sedimentation of rivers and streams caused by construction materials

c. Land take

- Report all grievances to the authorities for conflict resolution
- Pay all PAPs compensation according to laws of the country
- Establish dispute resolution committees
- Educate the affected people about the legal resolution mechanism.

d. Risk of drowning for the population during heavy rains

- Attach warning signs and/or raise barriers, and set up other precautions in all potential high-risk areas
- Implement community sensitization programs on safety measures to be taken.

v. Project Alternatives

To achieve a technically, environmentally and socially sustainable drainage design for the improvement of the drainage system in Ilala Municipality, several study analyses were conducted as part of the preparation of several reports that allowed for the various preferred project alternatives to be determined. The reports for these are as follows:

"Part 4 – Yombo River Basin Interventions - Kigilagila/ Minazi Mirefu/ Kiwalani areas and Mpogo River - 4.0 - Definition and Comparison of Solutions to Adopt (November 2013)

- Alternative 1: Inclusion of a detention pond on the upstream section of the Mpogo River and implementation of selected interventions along the watercourse to widen and/or improve the river to meet the necessary hydraulic requirements.

- Alternative 2: No inclusion of a detention pond on the upstream section of the Mpogo River but, instead, the implementation of selected interventions along the watercourse to widen and/or improve the river to meet the necessary hydraulic requirements.

The analysis conducted in the Report concluded that Alternative 1 offered the best option both in terms of lowest construction cost and through reduced impact on people and property.

Under the development of other two (2) reports, the analysis of the preferred alternatives considered only the "*Project implementation*" and the alternative "*Do Nothing*":

"Part 2 – Msimbazi River (IL5/IL8/IL10/IL11) - 2.1 – Preferred Option Analysis; 2.2 – Preliminary Design" (March 2013); and"Part 4 – Yombo River Basin Interventions (Kigilagila/Minazi Mirefu/Kiwalani areas and Mpogo River) - 4.1– Preferred Option Analysis; 4.2 - Preliminary Design" (March 2013).

In both reports it was concluded that "*Project implementation*" was the preferred alternative to the "*Do Nothing*" approach. The "*Do Nothing*" alternative implies that the storm water drainage in Ilala Municipality will not be improved at all. Current drainage conditions in the area underpin many of the environmental health hazards that local residents face, especially the vulnerable poor members of the community who live in unplanned settlements. Flood events will also continue to damage the existing infrastructure and utilities. In general, apart from creating health problems among the local community, the flood events will continue to damage individual properties, hence perpetuating poverty in the area. In light of the previous analysis, the "*Project implementation*" option was considered to be the best alterative as it entails the ideal interventions presented in chapter 2.0.

vi. 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 and 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 stand-alone document separately.

vii. Proposed Monitoring and Auditing

A monitoring regime was established and presented in the Environmental Management Plan (EMP) (presented as a stand-alone 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. Other aspects will be the responsibility of the contractors, and some should be carried out by other parties responsible 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).

viii. Cost-Benefit Analysis

For all sub-projects, 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).

For IL3 - Minazi / Mirefu and IL7 - Mtambani / Food Security Sub-projects a range of positive NPV amounts was computed for each different scenario. Thus, even for the worst scenario, there would still be a positive social return on those sub-projects.

For IL5, IL8, IL10B and IL11 Sub-projects a range of positive NPV amounts was computed for the different scenarios. Thus even for the worst scenario there would still be a positive social return on those sub-projects. IL10A Sub-project presents a negative social return in every tested scenario.

ix. Decommissioning

The Sub-project, which addresses the rehabilitation of storm water drainage systems in Ilala Municipality in conjunction with the construction of a detention pond, 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 flood events. However, in the unlikely event of decommissioning, the facility (drainage system) will be left to deteriorate. This will lead to occasional floods and associated health risks related to water borne diseases such as diarrhoea, dysentery, cholera, malaria etc. In such a scenario, the structures will be dismantled, debris collected, and the site cleared and rehabilitated. Mechanisms of identifying, collection and disposal shall be in place to ensure all wastes have been collected, removed and rightly disposed of. Areas disturbed by the 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 is the largest City and the major industrial and commercial centre in Tanzania with an estimated population of about 4.36 million people according to the National Population and Housing Census of 2012. The city's annual population growth rate of 5.6 percent accounts for 10 percent of the total population of Tanzania Mainland. The area of the City is about 1,590.5 square kilometres with a population density of 2,742 persons per square kilometre.

The Dar es Salaam Local Authorities (DLAs) 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. The aforementioned Local Government Authorities (LGA) are collectively referred to as the DLAs.

Dar es Salaam is experiencing significant problems with the existing surface water drainage system due to a lack of infrastructure and/or, where drainage infrastructure is in place, it is being used as an informal receptacle for dumping waste and this 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 namely 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 including Surface Water Drainage System Project that aims to improve Drainage management in the City.

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 for implementation under the DMDP.

In the Stage Ia[i] of the Project, a Drainage Plan prepared for Dar es Salaam city identified and prioritized a set of 13 interventions with the purpose of mitigating and/or preventing 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 a priority, and it is for these priority interventions that the following Environmental Impact Assessment (EIA) Report has been prepared.

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

The services involve carrying out an Environmental Impact Assessment and creating an 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 Report is for Sub-Projects to be developed in Ilala Municipality within Msimbazi and Yombo river basins which address the following interventions:

- IL3 – Improvement and rehabilitation of the existing of storm water drains at Minazi / Mirefu;
- IL5 – Improvement and rehabilitation of the existing storm water drains at Buguruni Kisiwani;
- Il7 – Improvement and rehabilitation of the existing storm water drains at Mtambani / Food Security;
- Il8 – Improvement and rehabilitation of the existing drains at Msimbazi, Tenge and Liwiti sub-divisions;
- IL10A – Improvement and rehabilitation of the existing drains at Tembo Mgwaza;
- IL10B – Improvement and rehabilitation of the existing storm water drains at Bonde la Sungura;
- IL11 – Improvement and rehabilitation of the existing Mafuriko Drain; and
- Construction of Mpogo detention pond at Kiwalani.

1.2. OBJECTIVES OF AN EIA

The objective of an EIA study is to carry out an assessment of a proposed project to determine whether the project and associated activities will have any adverse environmental, social, cultural and economic impacts taking into account legal considerations.

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 – the impacts that are likely to or may, 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) Ensure that environmental considerations are explicitly addressed and incorporated into the development decision making process;

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

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

(g) Promote development that is sustainable and optimises the use of resources 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 encompasses the following:

- Description of the baseline environment of the relevant project area;
- Identification of major environmental and social impacts which could impede project implementation and propose corresponding mitigation measures for the project;
- Identification of major environmental and social impacts to minimize pollution, environmental disturbance and nuisance during the construction and operation phases of the project;
- Identification and analysis of alternatives to the proposed project;

- Development of 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 and water for agriculture and manufacturing; offer opportunities for recreation, and provide habitat with 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. For this reason, this spatial boundary was considered for the majority of the environmental and social components, and is a study area corresponding to an overlap of the river basins bounded by the limits of the municipality. This area is about 6,317 ha in size.

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 while considering the entire river basin by its biophysics and socio-economic importance.

However, when deemed relevant to the objectives of this EIA, the spatial boundary was enlarged for some of the environmental and social components in the analysis according to the criteria defined by experts on the several components of the EIA. This was necessary in 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

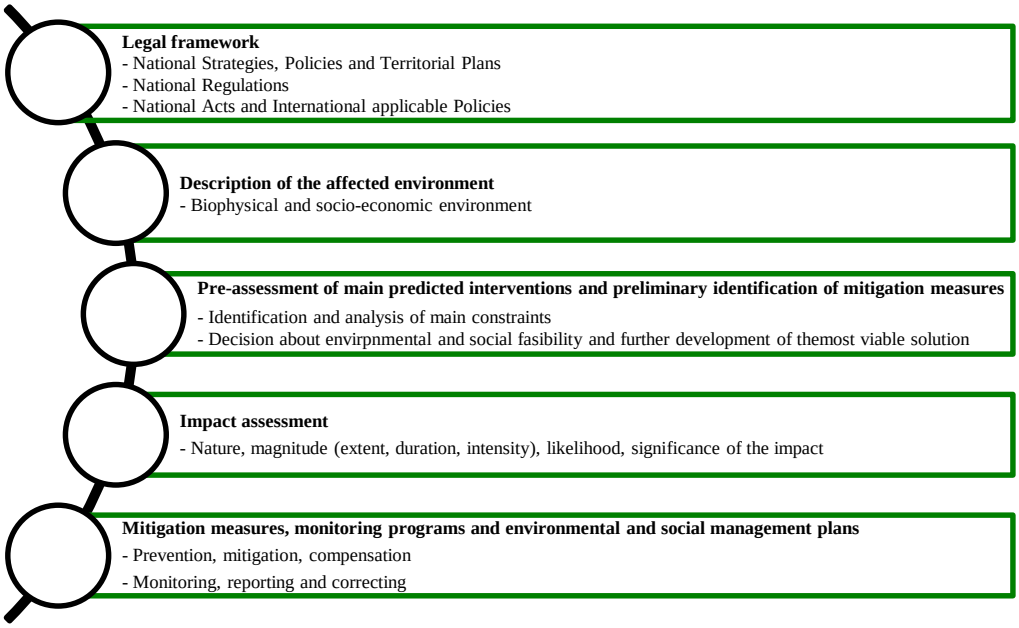
The temporal boundaries of the proposed interventions refer to the project lifespan and the reversibility of the impacts during the mobilization, construction and operation phases.

1.4.3 Institutional boundary

Matters concerning the institutional boundaries of the Sub-projects 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 that 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, infrastructural and socio-cultural) and were arranged

according to their 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 - was achieved by using the available digital and printed information, while planning field methodologies. The level of detail obtained depended on the relevance and sufficiency of the social information collected and disclosed by the detaining authorities.

1.5.2 Consideration of design alternatives

Various project alternatives were considered and from these the preferred options to meet anticipated project objectives successfully were selected. The alternatives considered compared the design, technology, location and construction techniques in terms of environmental and social related impacts.

1.5.3 Stakeholders consultations

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

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 of the 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 the site visit, the consultant team had been communicating with PMO-RALG about logistics related to the project time frame and field work. PMO-RALG prepared a letter of introduction to be presented to each stakeholder prior to 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 Ilala 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 included the Environmental Impact Assessment and Audit Regulations (2005), Environmental Code of Practice for Road Works (2008), 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 the district profile of Ilala 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 comprises 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 that are likely to be indirectly affected by the project activities. These include the 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. STRUCTURE OF THE REPORT

In accordance with Section 18 of the Environmental Impact Assessment and Audit regulations (2005) on the contents of an EIS, this report has been structured to have thirteen substantive chapters and appendices.

Chapter 1.0 – Introduction

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

Chapter 2.0 – Project Description

The major components of the project - including 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 Existing Baseline Conditions

This chapter 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 rehabilitation/improvement and operation of the project.

Chapter 5.0 – Stakeholders' Identification and Participation

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

Chapter 6.0 – Impact Identification and Assessment of Alternatives

This section describes 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

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

Chapter 8.0 – Environmental Management Plan (SMP)

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

This Monitoring Plan is designed to monitor the implementation of the EMP and check its 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

This chapter describes the foreseen activities 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 project follow up based on the identified impacts and the mitigation measures envisaged that intend 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: Appendices

The following appendixes are included:

- Terms of reference;
- Summary of stakeholders views and concerns;
- Signatures of stakeholders consulted;
- Project layout;
- Adopted Solutions;
- Location and Definition of Proposed Interventions - Ilala 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 bordered by the Indian Ocean to the East (**FIGURE 2**).

Administratively, the Sub-projects will be developed in Ilala Municipality according to the table below.

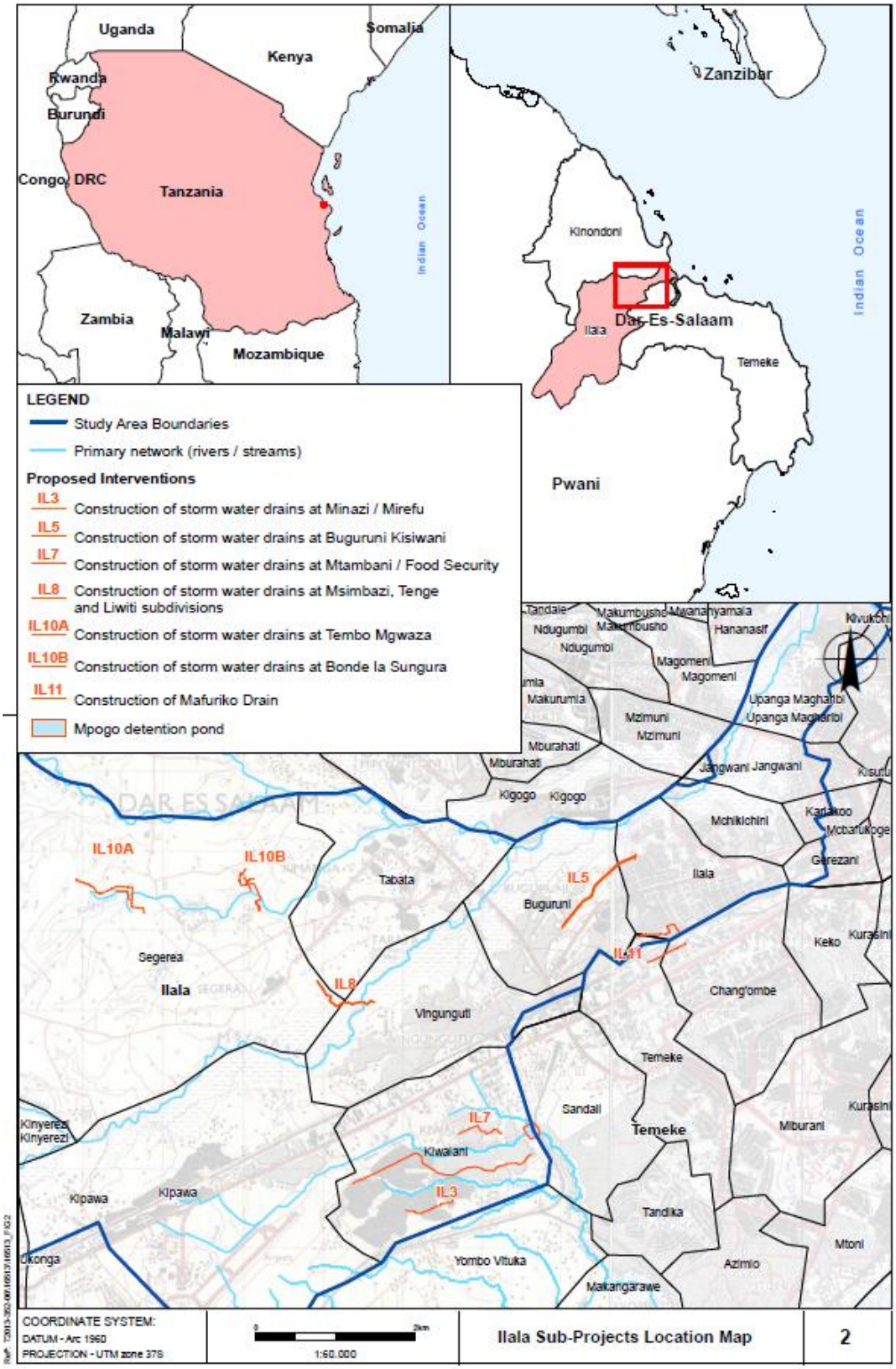
TABLE 1

PROJECT LOCATION (PRCESL/COWI 2014)

Municipality	Sub-Project	Ward
Ilala	IL3	Kiwalani
	IL5	Buguruni
		Ilala
	IL7	Kiwalani
	Il8	Tabata
	Il10	Segerea
	IL11	Ilala
	Mpogo Detention Pond	Kiwalani

(PROCESL/COWI, 2014)

Ilala is currently the administrative district of the city where almost all government offices and ministries are located. The district is made up of 26 wards where Vingunguti is the most populated ward (106,946 inhabitants) and Kariakoo is the least populated (1,378 inhabitants).



(PROCESL/COWI, 2014)

FIGURE 2

ILALA SUB-PROJECTS LOCATION MAP

According to Ilala Municipal Council records, agriculture is developed in about 10,019 ha of unplanned areas for food crops (7,201 ha) and cash crops (2,818 ha). Major food crops are cassava, sweet potatoes, paddy maize, cash crops include cashew nuts, coconuts and citrus fruits[ii].

One of the main environmental problems in Ilala Municipality is that of air quality. Most residents cannot afford electricity, and therefore charcoal and firewood are the main sources of energy for cooking and other domestic uses. This contributes to the problem of air quality and is aggravated by intense road traffic in urban areas[iii].

Ilala has a good number of industries concentrated along Nelson Mandela Road, Nyerere Road and in Chang'ombe area.

Unplanned settlements are increasing in poor infrastructure areas where many densely populated households use water boreholes next to pit latrines.

Msimbazi Valley is mainly vegetated by mangrove swamps, and currently experiences considerable environmental degradation, not only due to certain agricultural practices, but also from Vingunguti Dumpsite[iv]. Considering that the water from Msimbazi River is widely used for domestic and agricultural consumption, this poses serious health risks to the population.

The following photographs present a few examples of the places where the storm water drainage tends to flow in Ilala Municipality.

PHOTO 1

BUGURUNI KISIWANI

PHOTO 2

MSIMBAZI, TENGE AND LIWITI

PHOTO 3

BONDE LA SUNGURA

PHOTO 4

MAFURIKO

(Field work, PROCESL/COWI, 2014)

The water drains at Buguruni Kisiwani (**PHOTO 1**) are a mix of concrete pipes, lined channels and engineered earth channels passing through unplanned settlements. The houses are located very close to the drains which appear to be of an inadequate size.

At Tembo Mgwaza (**PHOTO 2**) there is no defined water channel/drain so runoff passes along the road. Some houses located downstream experience flooding and there is a guest house in the area that is constructed on top of the drain.

There is no defined drain/channel at Bonde la Sungura (**PHOTO 3**). The houses are constructed on a depression area which experiences frequent flooding.

Mafuriko (**PHOTO 4**) drains are engineered earth drains that pass through unplanned settlements, where solid waste blocks the cross culvert and main channel.

2.2 PROJECT COMPONENTS AND MATERIALS

2.2.1 Existing conditions

The existing drainage infrastructures in the interventions areas are constituted by some streams without continuity in some sections and rectangular/trapezoidal open channels with a general undersized cross section, very constrained in a significant number of areas by existing walls, informal constructions and other obstacles. The alternative of choosing different paths for the drainage infrastructures is also prejudiced due to the general absence of open spaces, beyond the existing main roads.

The existing drainage infrastructures are constituted by:

- earthy and partly concrete open channels along the IL3 and IL7 interventions. These drains are generally undersized and in some locations are implemented in private industrial areas and/or in very narrow and constrained paths. In general the existing culverts are also undersized;

- the Mpogo River which is an open channel drain with a generally adequate width but with low heights between the river bottom and the margins, currently occupied with houses. Additionally there are some dozens of houses located in the flood prone area, even in the river bed. Some of the existing culverts (crossing roads) and the bridge located at the end of the intervention are undersized;

- the undeveloped area identified for implementing a detention pond and constituted by an well-defined valley which currently acts as an informal pond allowing the detention of some storm water during intense rain events.

2.2.2 Project Components

The main objectives of the proposed interventions for Ilala Municipality are to:

- Avoid the accumulation of storm water in existing lower areas as caused by there being no natural way out or due to drainage infrastructures with insufficient capacity of transport;
- Service some areas with drainage infrastructure, avoiding the storm water to run along the roads/paths hampering the access of people and vehicles.

Specifically, the improvement of the Storm Water System in Ilala Municipality will have the following proposed interventions:

IL3 - Rehabilitation/improvement of storm water drains at Minazi / Mirefu

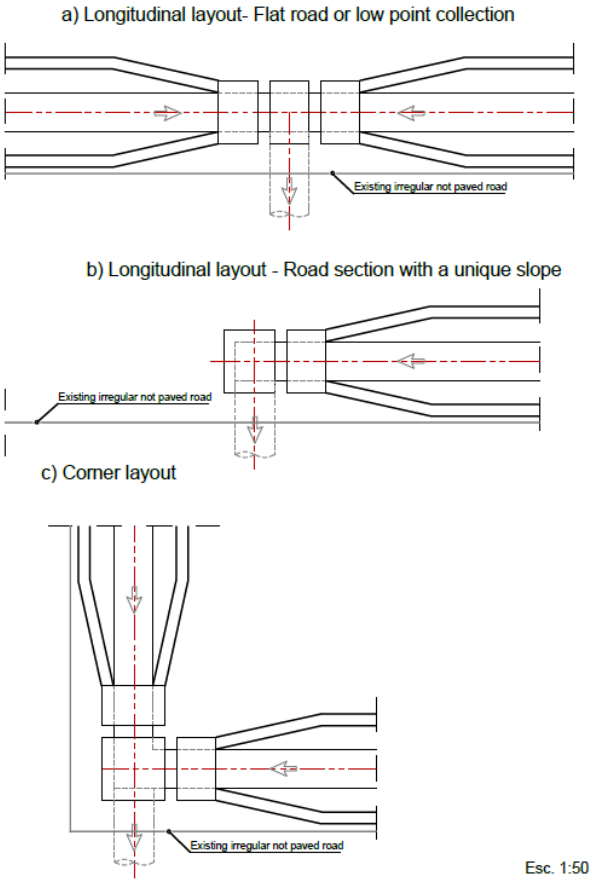
The intervention in Minazi Mirefu begins by the roadside located in the industrial area and will involve the enlargement of the existing drain, and an extension of 250m. The remaining 400m of the intervention is proposed to be an underground concrete frame which, in some stretches, crosses a private industrial area and requires the demolition and reconstruction of an existing wall. This option was chosen because the path of the existing channel is currently very narrow and its enlargement would require the demolition of some of the industrial buildings in that area.

A final outlet in reinforced concrete is proposed for the downstream section in order to direct the storm water flow towards the river and, thereby, minimize various adverse effects, such as bank erosion and water eddies.

In summary, the IL3 intervention comprises the following:

- Enlargement of concrete channels;

- Enlargement of culverts;
- Construction of concrete frames;
- Construction of final outlet;
- Construction of road drainage inlet.



(PROCESL/COWI, 2014)

FIGURE 3

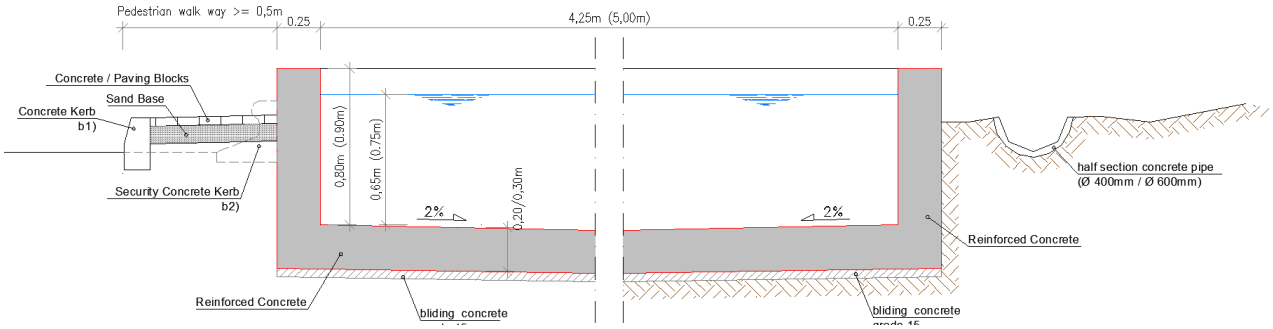
ROAD DRAINAGE INLET DETAIL

IL5 - Rehabilitation/improvement of storm water drains at Buguruni Kisiwani

IL5 intervention considers the enlargement/deepening of the existing channels/streams to the dimensions that would contain the estimated floodwaters. There is not enough space available for this type of solution as it would entail some detrimental implications for the current conditions in the area. The main implication is that the existing road width would be reduced, hence thwarting the access of people and vehicles to the left margin of the existing stream or, in more extreme cases, raising the need to demolish some houses.

In summary, the IL5 intervention comprises the following:

- Construction of rectangular open channels with bed and banks on reinforced concrete (**FIGURE 4**);
- Construction of final outlet on the existing river consisting of a bent concrete wall in the river bank;
- Construction of lateral drainage along the sections where the top of the channel is higher than the involving terrain;
- Construction of pedestrian crossing consisting of a concrete slab over the channel and a protection steel rail, including steps to access it if needed;
- Construction of vehicle crossing consisting of a concrete slab over the channel and a protection steel rail, including ramps to access it if needed.



(PROCESL/COWI, 2014)

FIGURE 4
CHANNEL DETAIL

IL7 - Rehabilitation/improvement of storm water drains at Mtambani / Food Security

Kiwalani Drain crosses a moderately densely populated urban area and most of its route is confined by the walls of the houses. It is proposed that the existing channel be enlarged everywhere it is possible to install the channel with the required dimensions without big constraints on dwellers. Hence, the last 185m of the intervention will be constituted by an underground concrete frame on a different path (a large road) than the existing one to avoid the demolition of some properties.

Also included in IL7 interventions, Food Security Drain has an extension about 2,650m length. This drain receives storm water from Julius Nyerere Airport on a culvert constituted by two pipes of 1,200mm diameter. It was considered in calculations that this culvert will not be changed and the Kigilagila Drain will only accommodate the flow from the airport corresponding to the maximal capacity of the referred culvert.

The upstream sections, approximately 1,000 m, are located along the road and include several culverts to allow vehicular crossing to the industries operating in this area. Considering the large

distance between the walls (more than 10 m) and the very low longitudinal slope of the referred road it is proposed that the existing channel be enlarged mainly by increasing the width.

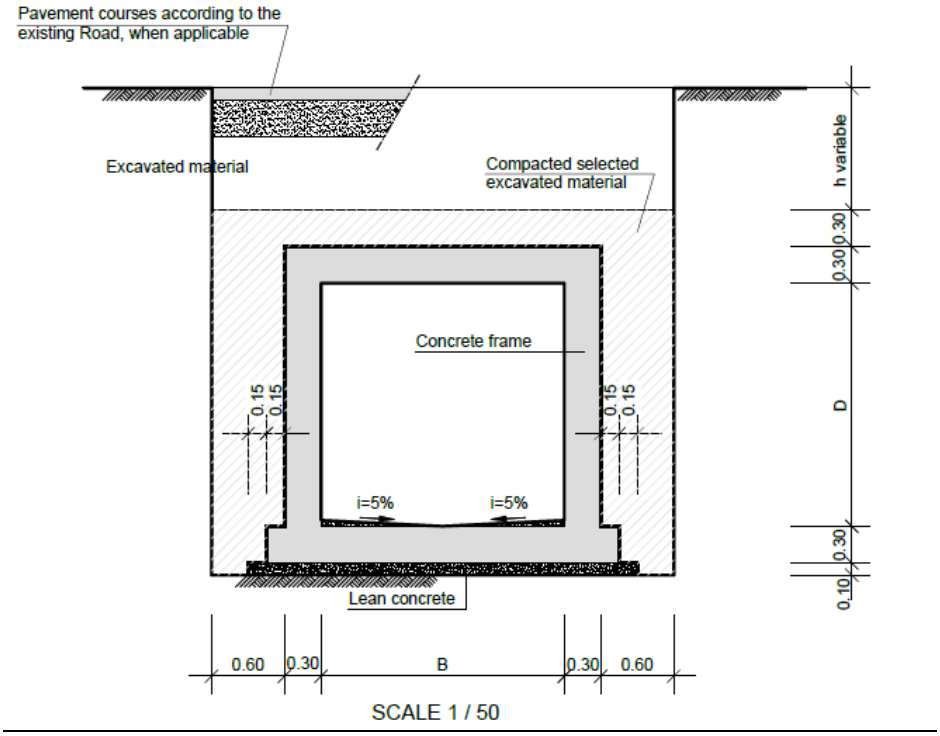
The following stretch, which is approximately 350m long, is located between a group of houses and a very high wall belonging to an industrial complex. Some properties need to be demolished because the distance between them and the mentioned wall is not enough to accommodate the channel. In some places there are counterforts supporting the referred wall. Hence, to avoid damaging this wall, the channel needs to be located considering some distance from there.

The last 1,250m of Kigilagila Drain crosses some urban areas and also needs to be enlarged. There is also the need to demolish some houses which are located in an inadequate proximity to the water stream.

In the final section, near the crossing under the railway where the influence of the detention pond water level is perceived, the construction of a final outlet in reinforced concrete which “spreads” the water on the valley is proposed. To protect some houses from the backwater caused by the detention pond a protective reinforced concrete wall is proposed.

Summarizing, IL7 intervention comprises the following:

- Enlargement of concrete channels;
- Enlargement of culverts;
- Enlargement of 2 bridges;
- Maintenance of existing culverts;
- Maintenance of existing bridges;
- Construction of concrete frame;
- Construction of final outlet;
- Construction of road drainage inlet.



(PROCESL/COWI, 2014)

FIGURE 5

CONCRETE FRAME

IL8 - Rehabilitation/improvement of storm water drains at Msimbazi, Tenge and Luwiti sub-divisions

IL8 intervention considers two types of solutions. The first stretch, which is approximately 700 m in length, will have underground pipes and frames which will not coincide with the actual drain in most areas of the intervention. This option was chosen to minimize both the number of houses that will need to be demolished and the number of properties that will be affected, as well as to take in due account the opinion of local authorities after an accompanied field visit.

The underground pipes and frames will be in concrete. Manholes are stationed with a maximum distance of 100 m (or 200 m for depth higher than 1.5 m) between them.

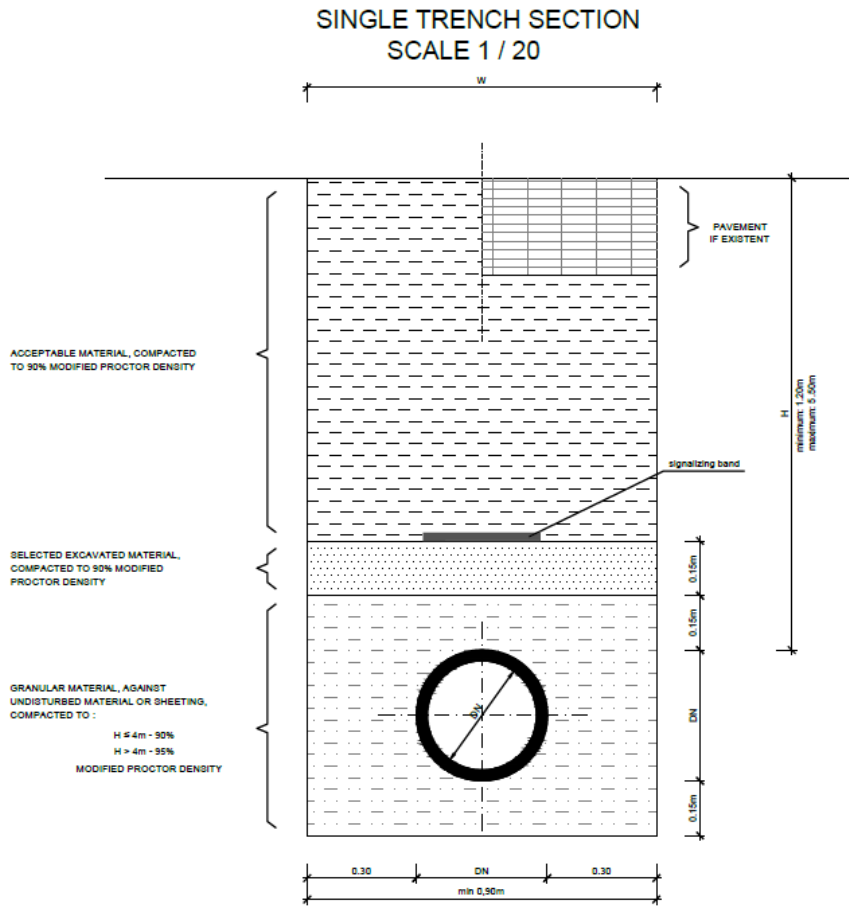
In order to collect the superficial storm water flow and direct it towards the underground infrastructures, the construction of several inlets is recommended. These will consist of a concrete trapezoidal channel 3 to 8 m in length along the roadsides with a reinforced concrete box at the end which retains the solid material. From this box the storm water flows to a reinforced concrete manhole and thereafter to the pipe that is linked to the main drain manhole. This option was chosen bearing in mind that the existing roads are irregular and unpaved, and that there is the risk of excessive erosion in the vicinity of the gullies.

The last 250 m stretch of the intervention will consist of a reinforced concrete open channel, which coincides with the existing one. This will be enlarged and lined, as recommended. Considering the big slopes located downstream and the narrow space available to install the channel, it is proposed that a square channel should be fashioned, the existing channel lowered, and the existing channel width maintained.

A final outlet in reinforced concrete is proposed for the downstream section where the drain ends at a confluence with Msimbazi River. Its purpose will be to direct the storm water flow to the river, minimizing the adverse effects, such as bank erosion and water eddies.

In summary, the IL8 intervention comprises the following:

- Lay and supply of concrete pipe;
- Lay and supply of underground concrete rectangular frame;
- Construction of rectangular open channel with bed and banks on reinforced concrete;
- Construction of reinforced concrete manholes including cast iron frame and cover and steps in glass fibre reinforced plastic;
- Construction of road drainage inlet consisting of a trapezoidal open channel along the roadside; a reinforced concrete box to retain the solid materials; a reinforced concrete manhole to collect the storm water; and a pipe to link to the storm water network;
- Construction of a pedestrian crossing consisting of a concrete slab over the channel and a protection steel rail, including steps to access it if needed;
- Construction of a vehicle crossing consisting of a concrete slab over the channel and a protection steel rail, including ramps to access it if needed.



(PROCESL/COWI, 2014)

FIGURE 6

UNDERGROUND PIPE

IL10A - Rehabilitation/improvement of storm water drains at Tembo Mgwaza

The proposed solution involves an underground network of concrete pipes and frames that is approximately 1,550 m in length. This network will not coincide with the actual drain entirely. This option was chosen to minimize the dimensions of the proposed underground frames in some parts of the network and to avoid affecting some properties that are constructed over the current channel in some downstream sections.

The underground pipes and frames will be in concrete. Manholes are proposed in all directions with a maximum distance of 100 m (or 200 m for depth higher than 1.5 m) between them.

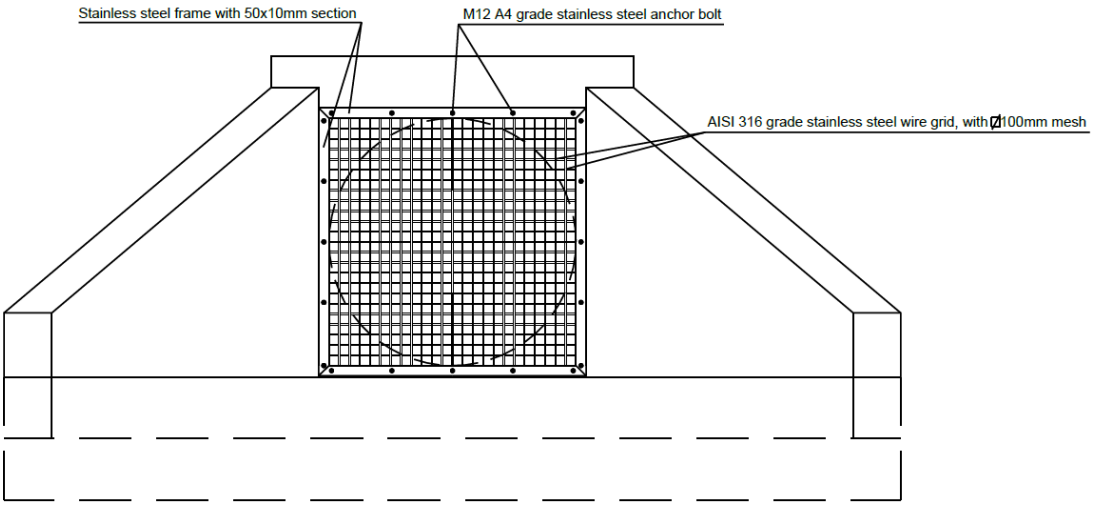
In order to collect the superficial storm water flow and direct it towards the underground infrastructures the construction of several inlets is recommended.

The construction of a special reinforced concrete box for collecting the flow coming from the existing open drain is also proposed.

A final outlet in reinforced concrete is proposed for the downstream section where the stream ends in a confluence with the main river. This outlet will direct the storm water flow to the river, and minimize adverse effects, such as bank erosion and water eddies

In summary, the IL10A intervention at Tembo Mgwaza comprises the following:

- Lay and supply of concrete pipes;
- Construction of rectangular open channel;
- Lay and supply of underground concrete rectangular frame;
- Construction of manhole to allow the catchment of open channel flow to the underground frame, including the correction of the river bed in the nearest upstream stretch;
- Construction of road drainage inlet consisting of a trapezoidal open channel (L=5m) along the roadside, a reinforced concrete box to retain the solid materials, a reinforced concrete manhole to collect the storm water and a pipe to link to the storm water network.



(PROCESL/COWI, 2014)

FIGURE 7

FINAL OUTLET

IL10B - Rehabilitation/improvement of storm water drains at Bonde la Sungura

The underground sewer will begin on the North side of the referred flat area and will direct the collected storm water to the existing river. The storm water will be collected from both the road drainage and the open channels proposed for the referred flat area. To collect the water on the roads the construction of several inlets is recommended (**FIGURE 8**). These structures will not be proposed along the main asphalt road where the downstream sections of the sewer will be constructed because this road already has a storm water drainage system.

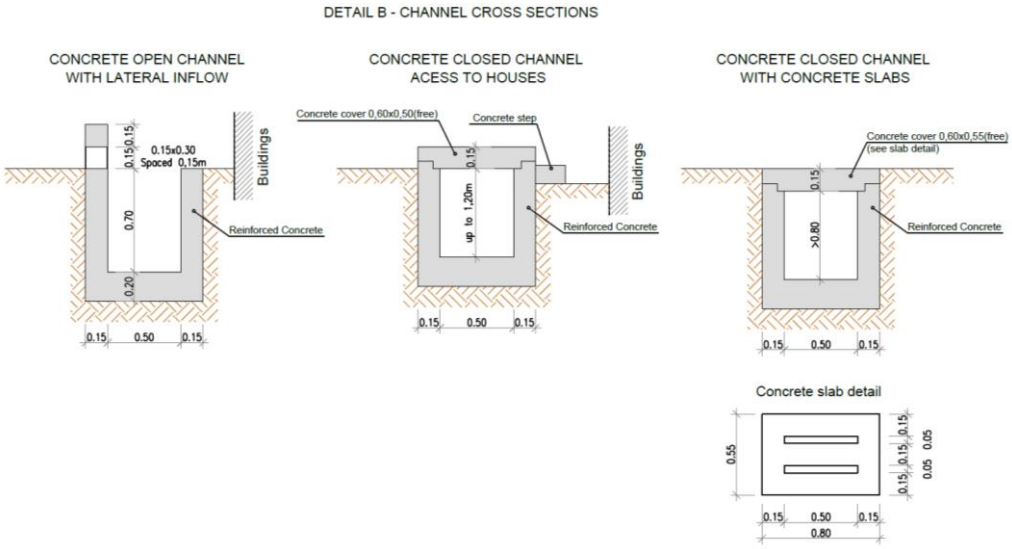
The underground pipes will be in concrete. Manholes are proposed in all directions with a maximum distance of 100 m between them.

A final outlet in reinforced concrete is proposed for the last downstream section, where the drain ends at the confluence with the main stream. This outlet will direct the storm water flow towards the river, thus minimizing adverse effects, such as bank erosion and water eddies.

The final stream section will be enlarged and lined with reinforced concrete after the discharge (approximately 140 m). The proposed cross-section, which is trapezoidal and 1.0 m deep and 2.5 m wide at the bottom, approximately corresponds with the existing section that will be subject to interventions.

In summary, the IL10B intervention at Bonde la Sungura comprises the following:

- An underground sewer that is approximately 700 m long and has a diameter between 500 and 1,000 mm;
- Two reinforced concrete open channels that are 0.5 m wide located in the flat area of the upstream section of the intervention; this is about 250 m long in total;
- Enlarging and lining in reinforced concrete for approximately 150 m of the river which makes up the downstream section of the existing drain.



(PROCESL/COWI, 2014)

FIGURE 8

ROAD DRAINAGE INLET DETAIL

IL11 - Rehabilitation/improvement of Mafuriko drains

The construction of underground frames (reaching an approximated total of 1,250 m in length) is proposed to regularly collect the flow from the referred drains. These reinforced concrete frames will be superficial without the minimum usual required cover in order to guarantee the outfall elevation on the main drain (final discharge).

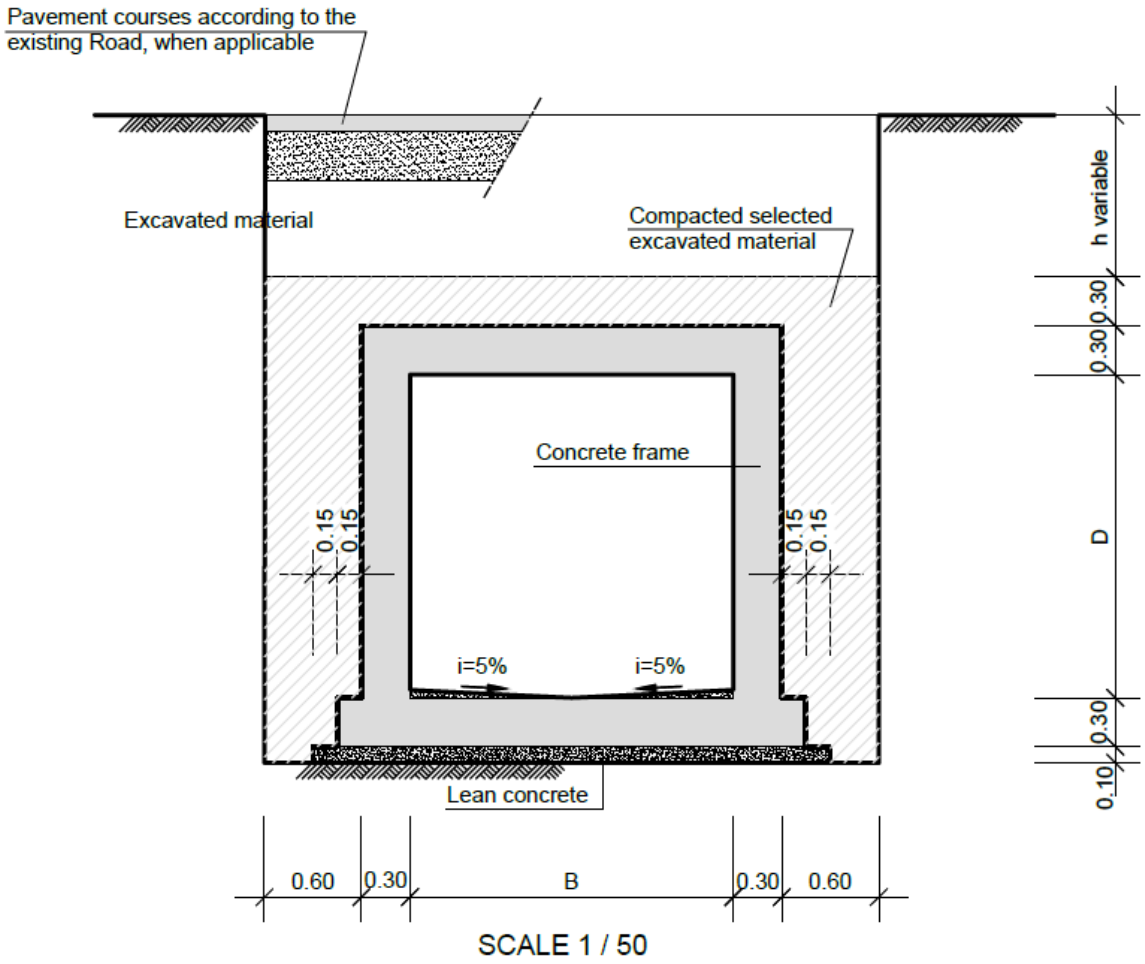
Manholes will be located in all directions with a maximum distance of 100 m between them.

The construction of special concrete gullies in the bottom is proposed to collect water from the existing drains to the underground frame. These will be connected to the manholes by a concrete 300 mm dia. pipe.

It is assumed that the current works will provide the road with adequate storm water drainage so that the North side road can undergo these interventions. In summary, the IL11 intervention comprises the following:

- Lay and supply of underground concrete rectangular frame;
- Construction of road drainage inlet consisting of a trapezoidal open channel (L=5m) along the roadside, a reinforced concrete box to retain the solid materials, a reinforced concrete manhole to collect the storm water, and a pipe to link the inlet to the storm water network;
- Deepen open channels;

- Construction of a device to collect the storm water from the existing culvert including two reinforced concrete manholes.



(PROCESL/COWI, 2014)

FIGURE 9

CONCRETE FRAME SECTION

Construction of Mpogo detention pond

The construction of the detention pond is in the Tazara area, South of Tazara Railway Station. The currently undeveloped land that has been designated for this construction has a volume of 100 000 m^3 and an area of 35 000 m^2. This land has a natural depression however for the purpose of the construction of this pond, a geometrical artificial reservoir specifically designed for limiting the affected land will be required. Therefore considerable earthworks will be necessary to create the needed volume for water. This solution considers the fact that the area north of the detention pond will be subject to the necessary earth filling (by TPA) for establishing a regular platform for the

containers at an altitude of 32.0 m. Thus it is assumed that the surrounding land for the North margin of the proposed detention pond is already established at this altitude.

TABLE 2

CHARACTERISTICS OF MAIN COMPONENTS – PROPOSED SOLUTION

KIWALANI		
KM	**Length (m)**	**Works description**
0+000 to 0+227	227	Construction of rectangular open channel with 1.00 m depth and 1.50 m width with bed and banks on reinforced concrete
0+227 to 0+390	163	Construction of rectangular open channel with 1.00 m depth and 1.75 m width with bed and banks on reinforced concrete
0+390 to 0+530	140	Construction of rectangular open channel with 1.00 m depth and 2.00 m width with bed and banks on reinforced concrete
0+530 to 0+713	183	Lay and supply of underground concrete rectangular frame with 1.00 m depth and 2.25 m width
	1 unit	Construction of final outlet in reinforced concrete, including a grade in stainless steel to protect the outlet pipe entrance
	4 units	Construction of pedestrian crossing consisting in a concrete slab over the channel and a protection steel rail, including steps to access it if needed
	3 units	Construction of vehicular crossing consisting in a concrete slab over the channel and a protection steel rail, including ramps to access it if needed
KIGILAGILA (Food Security)		
KM	**Length (m)**	**Works description**
0+000 to 0+120	120	Construction of rectangular open channel with 1.30 m depth and 1.50 m width with bed and banks on reinforced concrete
0+120 to 0+300 and 0+511 to 0+778	449	Construction of rectangular open channel with 1.30 m depth and 4.00 m width with bed and banks on reinforced concrete
0+300 to 0+511	211	Lay and supply of underground concrete rectangular frame with 1.05 m depth and 4.00 m width
0+778 to 0+886	108	Construction of rectangular open channel with 1.50 m depth and 4.00 m width with bed and banks on reinforced concrete
0+886 to 1+040	154	Construction of rectangular open channel with 1.75 m depth and 4.00 m width with bed and banks on reinforced concrete
1+040 to 1+482	442	Construction of rectangular open channel with 1.50 m depth and 4.00 m width with bed and banks on reinforced concrete
1+482 to 1+572 and 1+708 to 2+611	903	Construction of rectangular open channel with 1.50 m depth and 5.00 m width with bed and banks on reinforced concrete
1+483; 1+586; 2+159	3 units	Enlargement of bridge section under a minor road to a depth of 1.50m and a bottom width of 5.00 m.
	1 unit	Construction of final outlet in reinforced concrete, including a grade in stainless steel to protect the outlet pipe entrance
Final section	110	Construction of marginal concrete walls to protect terrains/ houses from flooding.

	2 units	Construction of pedestrian crossing consisting in a concrete slab over the channel and a protection steel rail, including steps to access it if needed
	8 units	Construction of vehicular crossing consisting in a concrete slab over the channel and a protection steel rail, including ramps to access it if needed
MINAZI MIREFU		
KM	**Length (m)**	**Works description**
0+000 to 0+080	80	Construction of rectangular open channel with 0.75 m depth and 1.50 m width with bed and banks on reinforced concrete
0+080 to 0+253	173	Construction of rectangular open channel with 1.25 m depth and 1.50 m width with bed and banks on reinforced concrete
0+253 to 0+360	107	Lay and supply of underground concrete rectangular frame with 1.00 m depth and 1.00 m width
0+360 to 0+572	212	Lay and supply of underground concrete rectangular frame with 1.00 m depth and 1.50 m width
0+572 to 0+686	114	Construction of rectangular open channel with 1.00 m depth and 1.50 m width with bed and banks on reinforced concrete
	6 units	Construction of reinforced concrete manholes including cast iron frame and cover and steps in glass fibre reinforced plastic.
	1 unit 4 units	Construction of final outlet in reinforced concrete, including a grade in stainless steel to protect the outlet pipe entrance Construction of vehicular crossing consisting in a concrete slab over the channel and a protection steel rail, including ramps to access it if needed
BUGURUNI		
KM	**Length (m)**	**Works description**
0 to 0+199	199	Construction of rectangular open channel with 0.65 m depth and 4.25 m width with bed and banks on reinforced concrete
0+199 to 0+449	250	Construction of rectangular open channel with 0.75 m depth and 5.00 m width with bed and banks on reinforced concrete
0+449 to 0+562	113	Construction of rectangular open channel with 1.00 m depth and 5.00 m width with bed and banks on reinforced concrete
0+562 to 0+712	150	Construction of rectangular open channel with 1.20 m depth and 5.00 m width with bed and banks on reinforced concrete
0+712 to 1+065	353	Construction of rectangular open channel with 1.40 m depth and 5.00 m width with bed and banks on reinforced concrete
1+065 to 1+324	259	Construction of rectangular open channel with 2.00 m depth and 8.00 m width with bed and banks on reinforced concrete
1+324		Construction of final outlet on the existing river consisting in a bent concrete wall in the river bank
Several		Construction of lateral drainage along the sections where the top of the channel is higher than the involving terrain
	10 units 4 units	Construction of pedestrian crossing consisting in a concrete slab over the channel and a protection steel rail, including steps to access it if needed Construction of vehicles crossing consisting in a concrete slab over the channel and a protection steel rail, including ramps to access it if needed
TENGE and LUWITI		
KM	**Length (m)**	**Works description**

0 to 0+271	271	Lay and supply of concrete pipe with 1,000 mm diameter
0+271 to 0+342	71	Lay and supply of concrete pipe with 1,200 mm diameter
0+342 to 0+710	368	Lay and supply of underground concrete rectangular frame with 1.5 m depth and 1.5 m width
0+710 to 0+956	246	Construction of rectangular open channel with 1.50 m depth and 1.50 m width with bed and banks on reinforced concrete
	13 units	Construction of reinforced concrete manholes including cast iron frame and cover and steps in glass fibre reinforced plastic.
Several		Construction of road drainage inlet consisting in a trapezoidal open channel (L=5m) along the roadside, a reinforced concrete box to retain the solid materials, a reinforced concrete manhole to collect the storm water and a pipe to link to the storm water network.
	5 units	Construction of pedestrian crossing consisting in a concrete slab over the channel and a protection steel rail, including steps to access it if needed
	3 units	Construction of vehicles crossing consisting in a concrete slab over the channel and a protection steel rail, including ramps to access it if needed
TEMBO MGWAZA		
KM	**Length (m)**	**Works description**
0 to 0+101	101	Lay and supply of concrete pipe with 300 mm diameter
0+101 to 0+203	102	Lay and supply of concrete pipe with 400 mm diameter
0+203 to 0+611	408	Lay and supply of concrete pipe with 800 mm diameter
0+611 to 0+723	112	Lay and supply of concrete pipe with 1,000 mm diameter
0+723 to 0+784	61	Lay and supply of underground concrete rectangular frame with 1.0 m depth and 1.25 m width
0+784 to 0+930	146	Lay and supply of underground concrete rectangular frame with 1.0 m depth and 1.5 m width
0+930 to 1+020	90	Lay and supply of underground concrete rectangular frame with 1.0 m depth and 2.0 m width
1+020 to 1+243	223	Lay and supply of underground concrete rectangular frame with 1.0 m depth and 2.5 m width
A0 to A0+042	42	Lay and supply of concrete pipe with 300 mm diameter
A0+042 to A0+100	58	Lay and supply of concrete pipe with 400 mm diameter
A0+100 to A0+241	141	Lay and supply of concrete pipe with 600 mm diameter
A0+241 to A0+303	62	Lay and supply of concrete pipe with 800 mm diameter
	1 unit	Construction of final outlet in reinforced concrete, including a grade in stainless steel to protect the outlet pipe entrance
0 to 0+723 and A0 to A0+303	27 units	Construction of reinforced concrete manholes including frame and cover in cast iron and steps in glass fibre reinforced plastic.
Several	1 unit	Construction of concrete box to allow the catchment of open channel flow to the underground frame, including the correction of river bed in the nearest upstream stretch Construction of road drainage inlet consisting in a trapezoidal open channel (L=5m) along the roadside, a reinforced concrete box to retain the solid materials, a reinforced concrete manhole to collect the storm water and a pipe to link to the storm water network.
BONDE LA SUNGURA		
KM	**Length (m)**	**Works description**

0 to 0+099	99	Lay and supply of concrete pipe with 500 mm diameter
0+099 to 0+236	137	Lay and supply of concrete pipe with 600 mm diameter
0+236 to 0+308	72	Lay and supply of concrete pipe with 800 mm diameter
0+308 to 0+678	370	Lay and supply of concrete pipe with 1,000 mm diameter
All C (on upstream flat area)	261	Construction of rectangular open channel with 0.50 m width with bed and banks on reinforced concrete
River stretch downstream the final outlet	136	Construction of trapezoidal open channel with 1.00 m depth and 2.50 m bottom width with bed and banks on reinforced concrete
	19 units	Construction of reinforced concrete manholes including frame and cover in cast iron and steps in glass fibre reinforced plastic.
Several	1 unit	Construction of final outlet in reinforced concrete, including a grade in stainless steel to protect the outlet pipe entrance Construction of road drainage inlet consisting in a trapezoidal open channel (L=5m) along the roadside, a reinforced concrete box to retain the solid materials, a reinforced concrete manhole to collect the storm water and a pipe to link to the storm water network.
MAFURIKO		
KM	**Length (m)**	**Works description**
	341	Lay and supply of underground concrete rectangular frame with 0.90 m depth and 1.50 m width
	368	Lay and supply of underground concrete rectangular frame with 1.00 m depth and 2.00 m width
	293	Lay and supply of underground concrete rectangular frame with 0.60 m depth and 1.50 m width
	229	Lay and supply of underground concrete rectangular frame with 0.85 m depth and 1.50 m width
Several		Construction of road drainage inlet consisting in a trapezoidal open channel (L=5m) along the roadside, a reinforced concrete box to retain the solid materials, a reinforced concrete manhole to collect the storm water and a pipe to link to the storm water network.
	19 units	Construction of reinforced concrete manholes including frame and cover in cast iron and steps in glass fibre reinforced plastic.
	7 units	Construction of a device to collect the storm water from existing trapezoidal open drain including a gully and a 300 mm dia. concrete pipe
	1 unit	Construction of a device to collect the storm water from existing culvert including two reinforced concrete manholes, a 350 mm dia. concrete pipe to replace the existing culvert and a 500 mm dia. concrete pipe to link to the proposed concrete frame

Safety and Maintenance aspects

One detention pond was proposed within the set of interventions. This infrastructure was characterized above and its design includes a set of strict safety measures developed as described in the table below, taking cognisance of advice detailed in "*Usual Safety Deficiencies in Urban Storm water Detention Ponds*", following the summary published in the Urban Drainage & Flood Control District Seminar of April 11, 2006, by Jonathan E. Jones et al.

All the area influenced by the detention pond will be fenced being not accessible for the people in general.

TABLE 3

DETENTION POND 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 the 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 the detention pond outlet. The inlets are the existing streams
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 will be specified
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 5 times the total outlet area (approximately 34.1 m^2 against 6.8 m^2)
Gaps between bars and concrete walls are too wide	The same for trash rack openings	A width of 150 mm will be specified
Side slopes of the facility are excessively steep or vertical without safety rails	No less than 3H/1V side slopes	Being the proposed detention pond an artificial geometrical "reservoir" the margins have a 1H/1V slope lined in concrete and it will be completely fenced.
Pond inflow and outflow pipes are in close proximity to one another	No criteria defined	The distance between the inlet and outlet of the designed detention pond are: is around 200 m, which is 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 a quarter of an hour after an intense rainfall occurs before the water in the detention ponds completely inundate the outlet pipes. The total time to fill the detention area is at least 1.25 hours. The outlets will be not visible during about 5.5 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 detention 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 Tazara land and will be surrounded by a Container Depot. The design solution includes the overall fencing of the detention pond
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 area, 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 in spite of all the area being fenced.
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.
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	All the area of detention pond will be fenced and prohibited the access to the people in general
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 is free of any kind of waste is very important.	Some protective passive measures were considered in this project.

(PROCESL/COWI, 2014)

2.2.3 Materials

The proposed material to be adopted in the design of the storm water pipes and frames is concrete (simple or precast, a function of the existing external loads) because of its good response to the abrasive effect of the suspended solids in the storm water (allowing for velocities higher than 3 m/s, which is usually not advisable for plastic materials).

For areas where it is expected or where it is suspected that the pipes are used as a combined network (storm water and waste water) the Pipes shall be internally lined with an appropriate coating to combat chemical attacks in the areas where it is expected/suspected that the pipes in used are part of a combined network (i.e. for both storm water and waste water). This situation is predictable for the areas not yet covered with waste water networks.

A construction detail using vertical walls and concrete for the banks and bed was assumed for open channel sections, after enlargement/rising.

The rehabilitation of the Storm Water System in Ilala Municipality will require the following construction materials and quantities:

- Concrete;
- Shotcrete,
- Precast concrete slabs;
- Stone masonry;
- Glass fiber;
- Plastic;
- Iron;
- Water;
- Soil earth materials, gravel and sand;
- Vegetation;
- Oil;
- Paper;
- Glass.

TABLE 4

QUANTITIES

	Msimbazi	Yombo
Excavations (m^3)	52.500	165.000
Fillings using excavated materials (m^3)	13.000	15.000
Fillings with materials from borrow sites (m^3)	18.500	13.500
Removal and restatement of road gravel pavements (m^3)	6.000	1.750
Surplus material to dispose in certified dump (m3)	39.500	170.000
Clearing vegetation and bushes (m^2)	0	40.000
Rock for gabions in detention ponds and channel linings (m3)	0	500
Reinforced concrete (m3)	10.500	9.000

(PROCESL/COWI, 2014)

Some of these materials might be used in the operation phase for activities of repairing and/or 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 217.500 m^3. Regarding filling the value of land rounds 60.000 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 rehabilitation/improvement 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 to are obtained locally 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 to may be locally obtained and will be provided by the IMC /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 rehabilitation/improvement is expected to increase the 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 workforce since he will be aware of the work schedule, the quality of the work that is needed, the budget for the workforce, and safety issues.

Between 150 and 200 workers will be needed. The range depends on the contractors working method/equipment etc. It is anticipated that every sub-project will be independently constructed, by the independent contractor. If some of the drainage sub-projects are performed by the same contractor, the total amount of workers needed will be reduced but this has not been taken into consideration.

2.2.7 *Compensation and Resettlement Issues*

The draft valuation report of affected assets recorded a total of affected households in Ilala Municipal and a total cost of TZS 1,082,534,190.90 (excluding management and contingency) (appendix 14.7). The affected assets include land, houses, external toilets, chambers/septic tanks, fences and foundations.

2.2.8 *Water and Sewerage System*

During the construction and operation phases, water will be supplied by DAWASCO. However, based on the nature of the Project and the rehabilitation/improvement 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.

DAWASA will be responsible for handling sewerage system concerns during the construction phase.

DAWASA was contacted 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 provide assistance during Project Execution.

2.2.9 *Type and Source of Energy*

According to the interview conducted between the consultant and TANESCO it was determined that TANESCO may provide services from its regional offices[v]. For construction and operation purposes, standby diesel power generators will be used.

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 **Error! Reference source not found.**). It will be the responsibility of the contractor to clean the site after 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)
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 phase

Prior to the commencement of civil works, the project area will need to be cleaned. 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 phase is estimated to last for at least four weeks.

2.3.2 Construction phase

The construction period, corresponding to the improvement and rehabilitation of the existing storm water drainage system, will last approximately 16 to 18 months, parallel with the Sub-projects planned for the other two municipalities.

The improvement and rehabilitation of the existing of the storm water drainage in Ilala Municipality will involve excavation, ditching and levelling activities. The Client has committed to identifying and designating specific locations for construction camps.

The important stages of construction 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 lateral drainage;
- Construction of channels;
- Construction of pedestrian crossing;
- Construction on vehicles crossing;
- Lay and supply of concrete pipes;
- Lay and supply of underground concrete rectangular frames;
- Construction of manholes;
- Restoration of the landscape;
- Land expropriation and resettlement of houses and infrastructures.

2.3.3 Operation phase

The main activities during the 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;
- Repair of pipes, relining of 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 programme 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;
- Activities for raising public awareness on the sustainable use of the storm water drainage network established.

2.3.4 Decommissioning Phase

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

CHAPTER 3.0: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

For the proposed water drainage system sub-projects in Ilala Municipality, a number of policies, legislation, regulations and environmental standards have been identified as being necessary guidance for the legal framework in which the project can best be implemented. This chapter details the policies and legislations that are relevant to the proposed project. Furthermore, the administrative framework that ensures that the proper recording and spread of information and interventions is followed has been provided below.

3.1 NATIONAL POLICIES

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 emphasises the need to formulate environmental legislation and sectorial legislations. This is an essential component for the effective and comprehensive management of the environment as well as for the improvement of the quality of life. Meaningful and effective environmental law must be clearly understood and valued by the communities and individuals at whom it is aimed.

The Sub-project will address the policy's objectives by ensuring that environmental issues are mainstreamed into the project planning and implementation.

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

The National Land Policy concerns land tenure, management and administration. The overall objectives of this policy are, among other things, to promote and ensure the existence of a secure land tenure system in Tanzania, and to sustainably foster the optimal use of land. This policy emphasizes on the importance of integrated planning and improved management of urban centres and the designation of urban and land uses, based on environmental impact considerations.

The policy 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. The policy explains that these services need to be used in a right manner so as to protect land for other uses and to 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 protecting public service utilities for environmental conservation, the design and improvement and rehabilitation of the existing storm water drains will consider the restoration of public service utilities and road infrastructure. The Project design, construction and operation will also ensure that solid waste does not accumulate and block drainage systems through periodically cleaning out open drains.

National Human Settlements Development Policy, 2000

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

(i) To sustainably promote the development of human settlements; and

(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 in attaining urban development and the need for coordinating and cooperating with other sectors/stakeholders, including Community-Based Organisations (CBOs), and Non-Governmental Organisations (NGOs) in urban development planning.

From a very preliminary stage of project development, the importance of stakeholders' involvement as well as that of other 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.

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 for the 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 proposed surface water drainage system sub-projects in Ilala Municipality will contribute to the protection of water resources once they will allow the natural storm water to flow into the receiving water bodies and will minimize the pollution of surface and underground water resources.

National Policy on HIV/AIDS, 2001

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

The Sub-project construction and operation will likely lead to the hiring of 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 the workers' awareness of their individual responsibility in the prevention of the epidemic.

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. The selection of priorities for each of the Sub-projects was done by the local communities. Relevant authorities which have influence on the projects have also been consulted, including DAWASCO and TANESCO.

3.2 NATIONAL LEGISLATION

Constitution of the United Republic of Tanzania, 1977

The current Constitution of the United Republic of Tanzania was ratified in 1977. It is the country's fourth Constitution since the country gained 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 improvement and rehabilitation of the existing storm water drains leads to 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 Assessments (EIA) for development projects in Tanzania. EMA provides a policy framework for environmental 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 and rehabilitation of the existing surface water drainage system in Ilala Municipality will be done in collaboration with Ilala Municipal Council.

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 repeals the Land Acquisition Ordinance and provides for the 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. The Public Health Act also addresses the protection of 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 and hygiene, human settlements, solid & liquid waste, food and 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, and that 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 Sub-project as it describes the manners in which solid and liquid waste will be collected, transported and disposed of appropriately particularly during the operation phase.

Occupational Health and Safety Act No. 5, 2003

The Occupational Health and Safety Act repeals the Factories Ordinance. It is an Act designed to make further provisions for securing the safety, health and welfare of people at work. By extension, 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 the Occupational Health and Safety Act is to foster a safe and healthy working environment for all employees.

Some of the 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 improvement and rehabilitation of the existing surface water drainage system in Ilala Municipality where risks of injury may occur and where workers will be required to use safety gear 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 Act covers 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 this Act into account and mitigating the impacts on water resources in their quantity and quality aspects.

Water Supply and Sanitation Act No. 12, 2002

Water Supply and Sanitation Act No. 12 (2002) establishes the legal framework for the management, adequate operation and transparent regulation of water supply and sanitation services with a view to giving 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 where it concerns prospecting, mining, processing and dealing in minerals, as well as with granting, renewing and terminating mineral rights, the payment of royalties, fees and other charges and any other relevant matters. Mining license applicants are required to submit plans for environmental protection.

This Act is relevant to the proposed Sub-project because earth materials and gravel may need to be acquired for construction activities. In order to minimize the environmental impacts associated with this operation recourse should be made preferably in quarries which are 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 Ilala 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.

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3.3 NATIONAL REGULATIONS

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. It prohibits carrying out projects without an environmental impact assessment, as is required under the Environmental Management Act, and defines 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 to environmental impact assessments and allow for appealing against decisions made by 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 as well as to enforce minimum air quality standards as prescribed by the National Environmental Standards Committee.

The Regulations help developers such as industrialists to keep abreast with environmentally friendly technologies that aim 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 that the objective of this standard is, among others, "to ensure protection of human health and the environment from various sources of pollution".

Soil Quality Standards Regulations, 2007

The Soil Quality Standards Regulations provide a framework for environmental protection considerations by different sectors to allow for cooperative decision making. This is to ensure that negative environmental impacts are minimal 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, the use of technologies and practices that are environmentally sound, and an emphasis on strengthening the environmentally sound use, monitoring, registration and management of agro-chemicals.

The risk for soil pollution at the construction sites is 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 Regulations guide 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 manufacturers 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 objective of these Regulations is to protect human health and to promote the conservation of the environment by enforcing minimum water quality standards as 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 the purposes of establishing environmental quality standards and values for each usage and to 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-projects will be held in streams, the risk of water contamination during the construction phase is high, particularly with regard to accidental spillages of oil and fuel from the vehicles and machinery designated for 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 compensation for land or "unexhausted improvement" to be paid by the Government. The basis for assessment shall be the market value of the land and certain allowances may be granted. Compensation for loss of land ownership 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 INTERNATIONAL CONVENTIONS

Tanzania is 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). In light of this, the

project proponent has the obligation to preserve any cultural heritage found at the project site.

- Convention concerning the Protection of Workers against Occupational Hazards in the Working Environment due to air pollution, noise, vibration and radiation. The aim is to ensure that workers have a safe working environment. Tanzania adopted it in 1977 and it came into force on 30 May 1984.
- Convention on Biological Diversity (CBD): species need to be protected, especially endangered and threatened ones. The proposed project however, is not located in a sensitive area that is rich in biodiversity. However, pollution to soil, air and water may affect some species. Thus it is the obligation of the project proponent to avoid pollution as much as is practically possible.

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[vi] 4.01, BP[vii] 4.01Environmental Assessment
- OP 4.11, BP 4.11 Physical Cultural Resources
- OP 4.12, BP 4.12 Involuntary Resettlement

OP/BP 4.01 - Environmental Assessment

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

This policy requires the Environmental Assessment (EA) of projects for which Bank financing has been proposed to help ensure that they are environmentally sound and sustainable, and to thus allow for informed decision making. The EA is a process for which the breadth, depth, and type of analysis depend on both the nature, scale, and potential environmental impact of the proposed investments under the DMDP, and on the 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 trans-boundary and global environmental aspects.

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

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; projects 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 Sub-project will have effects on physical cultural resources and cultural heritage, the appropriate conservation of archaeological artefacts and cultural values and any chance findings during construction is necessary, as is the maintenance of the main infrastructure works.

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 guidelines from 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 have a share of 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.

3.5 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 Vice President's Office-Division of Environment (VPO-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 presented here in brief in **TABLE 3.**

The National Environment Management Council (NEMC) is responsible for reviewing the EIA report. The Minister Responsible for Environment in the Vice President's Office will approve the implementation of the project after receiving recommendations from NEMC. The minister will issue an Environmental Impact Assessment Certificate after considering NEMC's recommendations.

The proponent (PMO-RALG) has to take the project through the approval process and take responsibility for maintaining compliance requirements throughout the project's life-time. The contractor is required to observe and comply with the conditions of the Environmental Certificate under the supervision of PMO-RALG or its representative and local authorities (such as district environmental coordinators). Other stakeholders will be responsible for alerting the relevant authorities when there is any breach of environmental laws. Local and village government authorities will in one way or another become associated with the project, and their roles and

responsibilities will feature in the project planning and implementation of the Environmental Management Plan.

The following table presents the main institutions involved and their respective responsibilities.

TABLE 7

RESPONSIBILITIES OF INSTITUTIONS

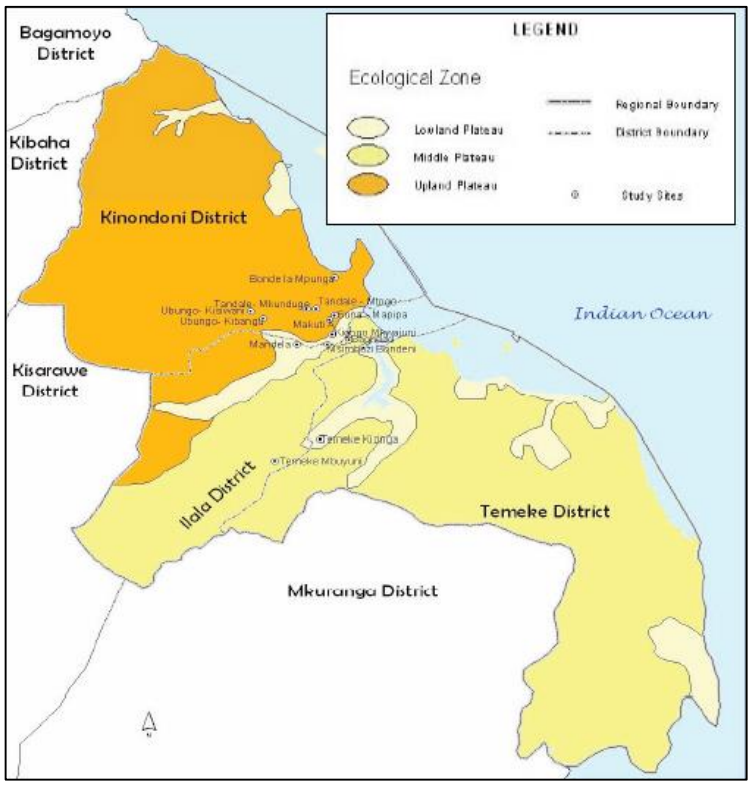
Administrative level	Institution	Responsibility
National	Vice President's Office, Minister Responsible for Environment	• Responsible for approval of the Environmental Impact Assessment; • Coordinate and monitor environmental issues; • Environmental Planning; • Environmental research.
	National Environmental Management Council (NEMC)	• Undertake enforcement compliance; • Review and monitor 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 Infrastructure Development	• 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 out regular environmental monitoring and internal audit.
	Local Government Authorities – Ilala 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 implementation of project activities for the benefit of the municipal environment; • Ensure the implementation of mitigation measures for the project as recommended in the EMP.
	District Departments of Planning, Natural Resources, Health, Lands, Community Development and Education	• Baseline data on socioeconomic 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 project development and the community; • Overseeing environmental matters at ward level.

CHAPTER 4.0: ENVIRONMENTAL AND SOCIO-ECONOMIC BASELINE CONDITIONS

4.1 BIOPHYSICAL CHARACTERISTICS

4.1.1 Topography

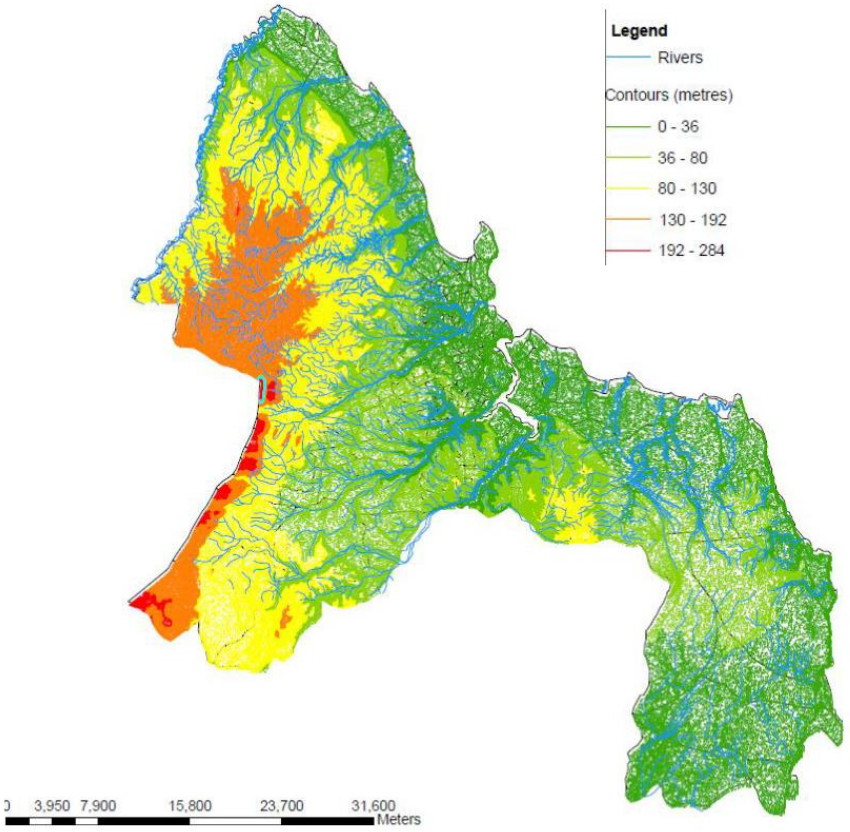
Dar es Salaam city is divided into three zones, namely the upland zone comprising of hilly areas to the west and north of the city, the middle plateau, and the lowlands, which include Msimbazi Valley, Jangwani, Mtoni, Africana and Ununio areas (**FIGURE 10**).



(PROCESL/COWI, 2014)

FIGURE 10
MAP OF DAR ES SALAAM MUNICIPAL DISTRICTS AND GEOMORPHOLOGICAL ZONES

Topographically the city lies in a 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 11** below and in **TABLE 8**.



(PROCESL/COWI, 2014)

FIGURE 11

MAP SHOWING THE TOPOGRAPHY OF DAR ES SALAAM REGION

TABLE 8

LOCAL TOPOGRAPHICAL CONDITIONS IN DAR ES SALAAM

	Level	Condition
Lowland	< 5 m	Areas in 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 plains/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

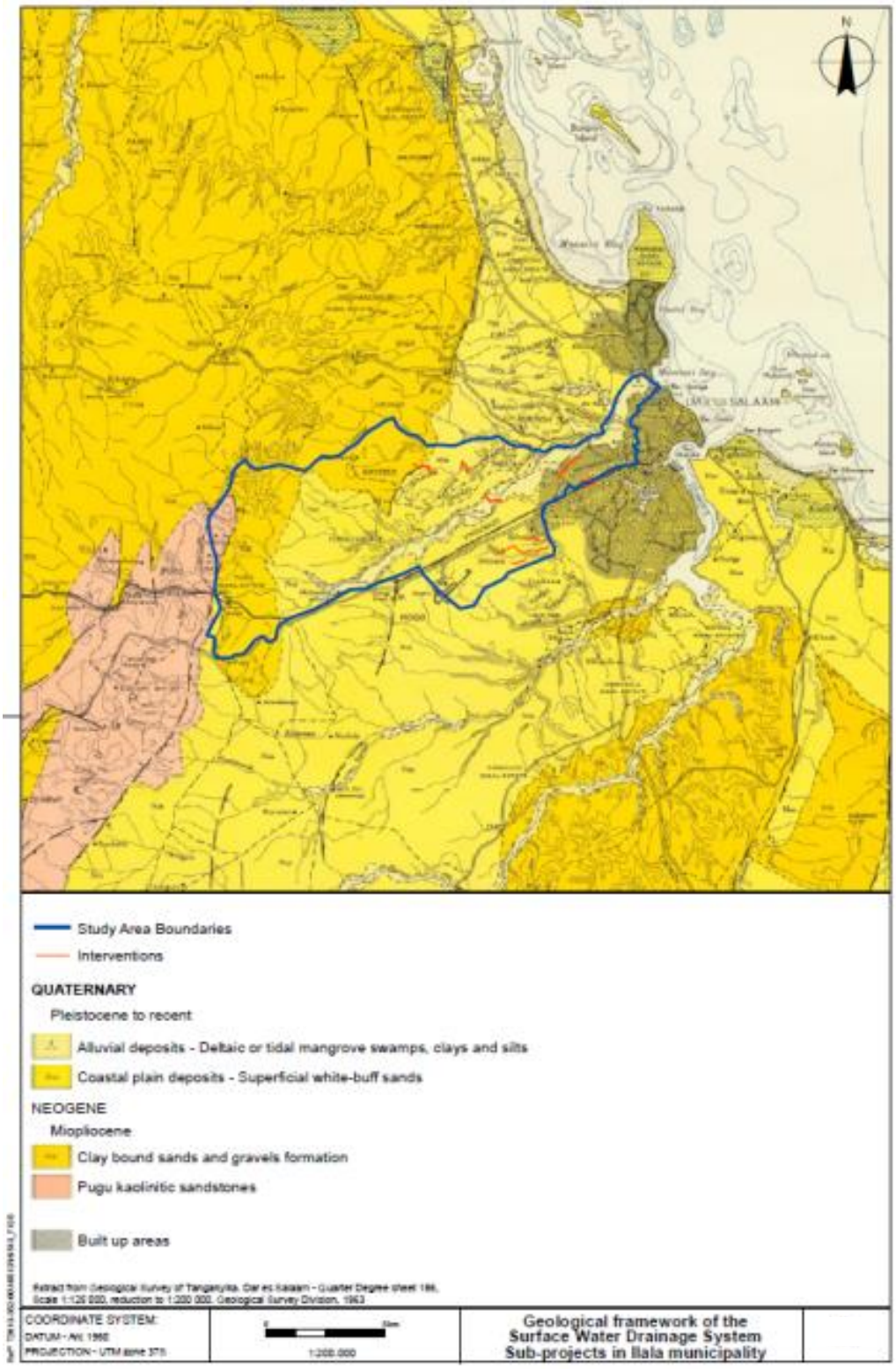
(PROCESL/COWI, 2014)

Specifically, the topography of the Direct Impact Area of the Sub-projects can be considered to be flat. When all interventions are considered, the highest elevation is found to be about 94 meters from the terrain and the lowest levels are less than 14 metres.

4.1.2 Geology and soils

GEOLOGY

According to the Quarter Degree Sheet 186 of the Geological Survey of Tanganyika (1963) (**FIGURE 12**) 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 consist of less consolidated terrace sands and sandstones and recent alluvium (Mtoni et al., 2012).



(Extract of Quarter Degree Sheet 186 of the Geological Survey of Tanganyika, PROCESL/COWI, 2014)

FIGURE 12

GEOLOGICAL FRAMEWORK OF THE SURFACE WATER DRAINAGE SYSTEM SUB-PROJECTS IN ILALA MUNICIPALITY

SOILS

The soil is a finite, limited and non-renewable resource. The degradation processes associated with its 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. The physical and chemical characteristics of the soils are associated with external factors that determine their suitability for use.

A 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). The soils here are distinguished on two taxonomic levels established by this classification: (1) a first level identified with the units corresponding 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 the detention pond will be deployed is a natural area, it is important to emphasize 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*." This allows for maximum allowed limits in habitat and agricultural soils to be established for the following pollutants: volatible organic compounds, heavy metals, pesticides and others chemicals.

SOILS CHARACTERIZATION

The thematic map developed for this characterization (**FIGURE 13** presented below) shows the presence of two main groups, divided on a soil-unit (**TABLE 9**).

TABLE 9

SOILS IN THE STUDY AREA

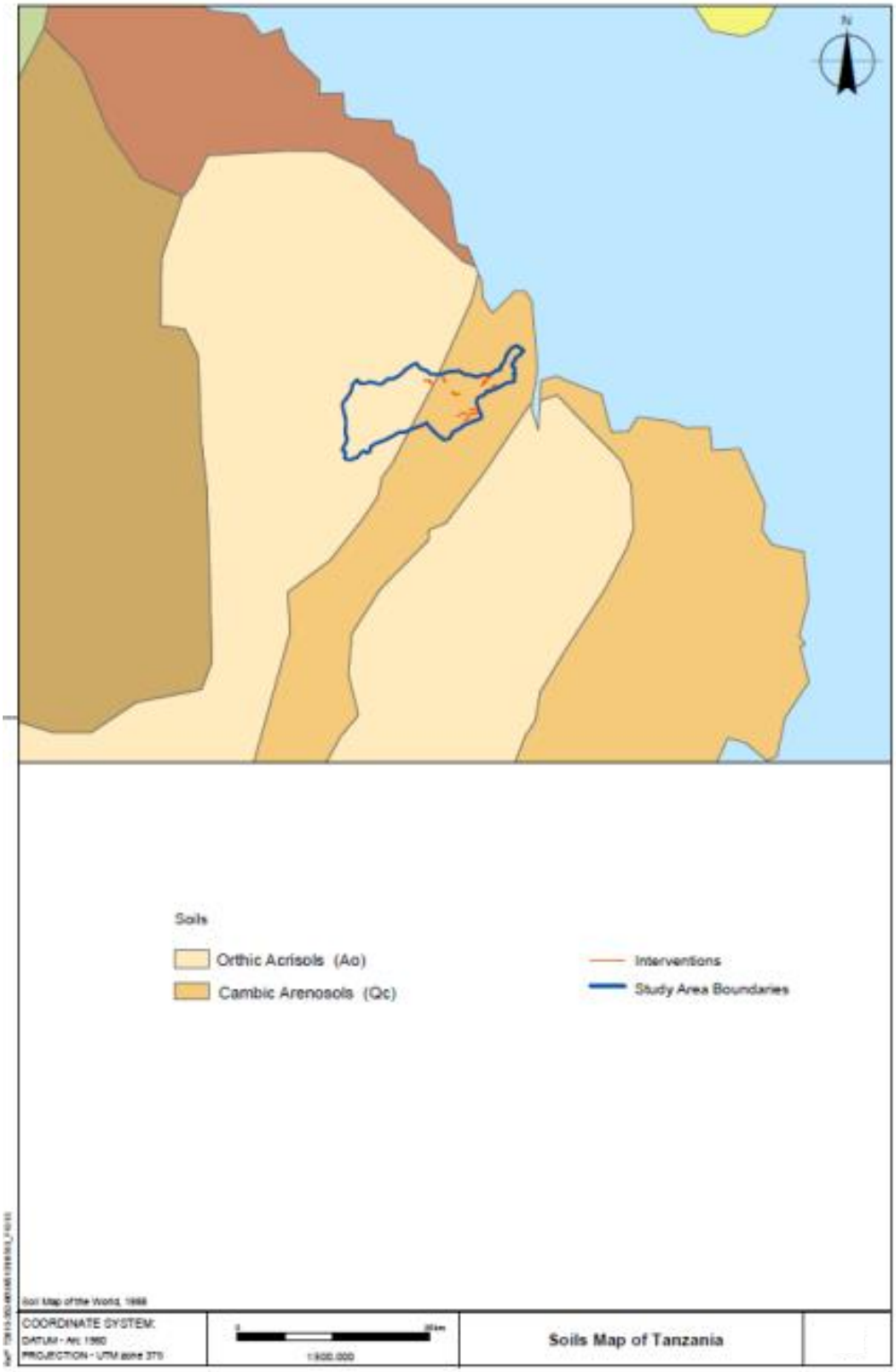
Main groups	Soil-unit
Acrisols (AC)	Orthic Acrisols (Ao)
Arenosols (AR)	Cambic Arenosols (Qc)

(PROCESL/COWI, 2014)

The Soil Group of the **Arenosols (AR)** occurs in the study area where interventions IL3, Il5, IL7, IL8, IL11 and part of IL10 will be carried out. 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 part of IL10 intervention will be carried out. These soils are typically red and yellow in wet tropical and subtropical regions. They are characterized by the 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).



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

FIGURE 13

SOILS MAP OF TANZANIA

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

Ilala Municipality has distinct soil types and rainfall regimes. The soil types range from coastal sandy with low fertility (along coastal areas), sandy clay loam soils with moderate fertility (inland low land areas) and alluvial soils with considerable agricultural potential (especially along creeks and the valleys).

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 14**) 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] that are associated with a combination of factors, natural and anthropic. These are listed in the following table, each with a specific action (**TABLE 10**).

TABLE 10

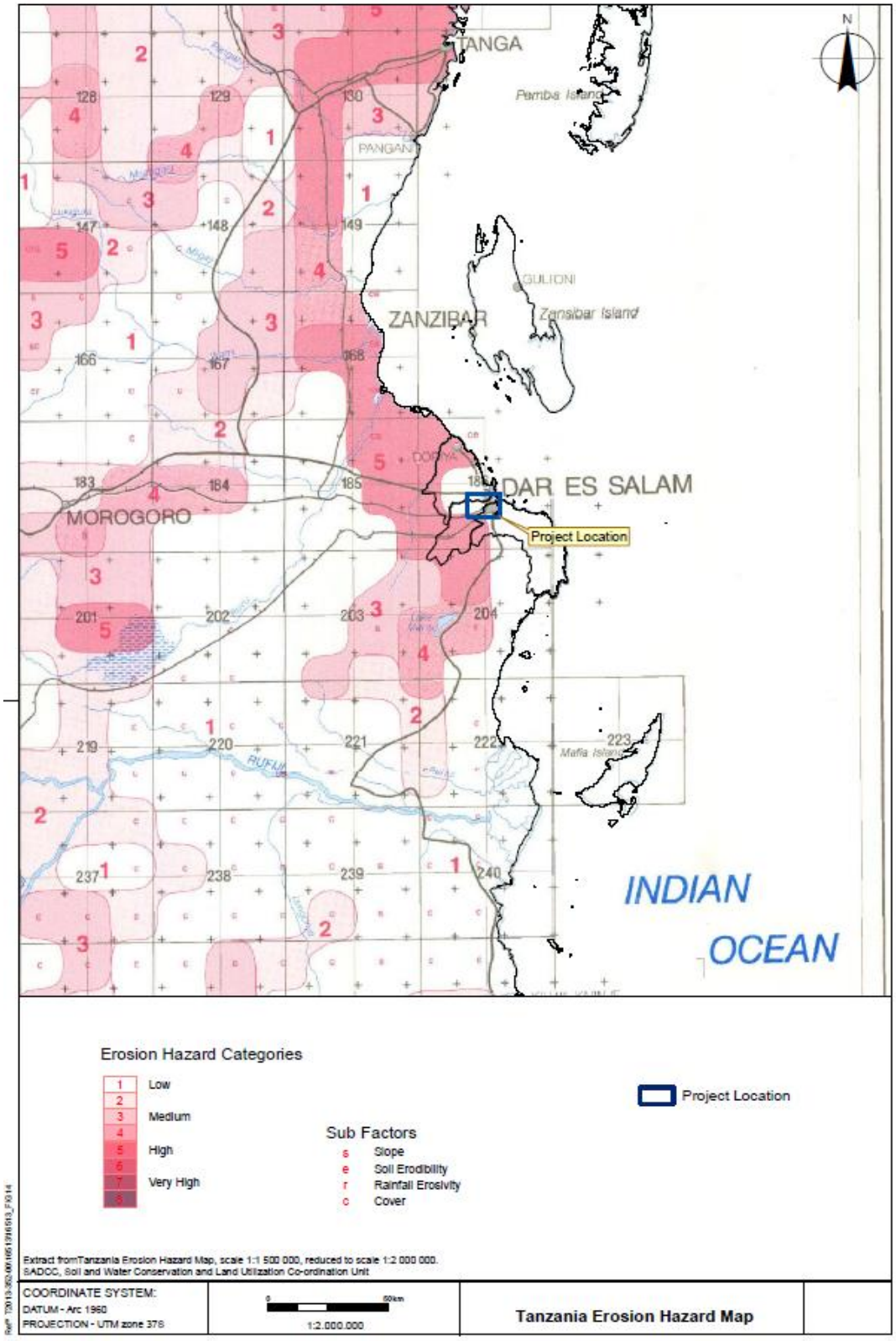
EROSION FACTORS

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

(PROCESL/COWI, 2014)

The following Figure 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 gentle 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 cover.



(Extract of Tanzania Erosion Hazard Map, PROCESL/COWI, 2014)

FIGURE 14

TANZANIA EROSION HAZARD MAP

There are several erosive evidences observed in the study area. The most threatening phenomena is siltation caused by spoils of waste disposed of 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, *BURUGUNI KISIWANI*

4.1.3 Climate

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. The rainfalls are distributed throughout the year, but peak during the rainy periods from March to May and in November, when about half of the annual rain falls. The annual average temperature in Dar es Salaam is 26 degrees Centigrade but with frequent temperatures over 30 degrees.

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 to 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

Msimbazi river basin has a length of approximately 60 km and a basin area of 240 km^2 and Yombo river has a basin area of 24.9 km^2.

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

WATER QUALITY

Yombo River is heavily polluted by industrial wastewater discharges from industries located to the north of the informal settlements. According to the 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 dominating much of the topsoil. High levels of heavy metals in soil and water could potentially be the cause of 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)].

SOURCES OF POLLUTION

According to the 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, particularly 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.

WATER SUPPLY AND SANITATION

Water supply and sanitation in Dar es Salaam are managed by the Dar es Salaam Water and Sewerage Authority (DAWASA) and Dar es Salaam Water and Sewerage Corporation (DAWASCO), and are 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.

DAWASA has nine sewage treatment networks, 8 of which use stabilization ponds to treat water before discharging it to nearby streams and rivers. The ninth covers the Central Business District

(CBD) and discharges directly into the sea via a 1 km pipe. These networks serve around 10-14% of the city area [Dar es Salaam Master Plan (2012 – 2032)].

Along Yombo basin, only small areas of the Mwembeladu and Sandali sub-wards have piped utility water. The supply has been unreliable for a long time and is only available during the night twice a week. Rainwater harvesting is practiced but because of inadequate storage facilities not much water is stored.

STORM WATER

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

The city drainage is broken down into two components. The first comprises 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, which is provided by individual landowners [Dar es Salaam Master Plan (2012 – 2032)].

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

TABLE 11

ILALA MUNICIPALITY COUNCIL TYPE OF STORM WATER DRAINAGE

Type of System	Condition			
	Good (km)	Fair (km)	Poor (km)	Total (km)
Lined	40	8	12	60
Unlined	---	---	42	42
Underground	5	12	38	55
Total	45	20	92	157

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

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 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, which is often in contact with the sandy aquifer, either underlying it or connected laterally. It is found mainly on Msasani Peninsula and along the coast, laterally connecting with or underlying the unconfined sand aquifer. Although locally each of the above aquifers is 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).

VULNERABILITY TO GROUND WATER POLLUTION

The vulnerability concept assumes that there are areas more susceptible to contamination than others, which result from the lithological and hydrogeological characteristics of the geological formations considered as aquifers. The unsaturated zone has a key role once its hydrogeological characteristics determine the greater or lesser protection of the aquifers.

Depending on the objectives and the areas to study and the available information and knowledge about the origin and type of pollutants, there are different methods to use for the local, regional and national scale. Among them the most widely used methods are the Hydrogeological (EPPNA) and the Parametric (DRASTIC).

The EPPNA method represents a qualitative method that considers only the lithology. For this method a table with the type of aquifer, class and the corresponding degree of vulnerability was prepared (**TABLE 12**).

TABLE 12

EPPNA METHOD – VULNERABILITY CLASSES BY AQUIFER LITHOLOGICAL TYPE

Aquifer type	Vulnerability	Class
Aquifer in carbonate rocks with high karstification	High	V1
Aquifer in carbonate rocks with middle to high karstification	Medium to High	V2
Aquifer in unconsolidated sediments with hydraulic connection with surface water	High	V3
Aquifer in unconsolidated sediments without hydraulic connection with surface water	Medium	V4
Aquifer in carbonate rocks	Medium to Low	V5
Aquifer in fissured rocks	Low to Variable	V6
Aquifer in consolidated sediments	Low	V7
Without aquifer	Very Low	V8

(Adapted from EPPNA)

According to the EPPNA classification, the upper aquifer and the semi-confined aquifer in the study area comprises unconsolidated material that corresponds to aquifers in unconsolidated sediments with hydraulic connections with surface water. These are classified as having *high* vulnerability (V3).

The DRASTIC method requires the selection of a set of parameters that are considered representative for assessing the degree of vulnerability to which a system of weighting factors is added.

The groundwater vulnerability map of Dar es Salaam City, based on the DRASTIC model, shows that 50% of the city falls under the high vulnerability zone, meaning that, the groundwater in the city can be easily polluted, with less natural protection against pollution sources. Therefore, indiscriminate waste disposal present in Dar es Salaam poses a great danger of polluting the groundwater (Mato, 2002).

The study area is located in an area classified in the DRASTIC model as having a *high*, *moderate* and *low* vulnerability.

GROUNDWATER QUALITY

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 Air quality

This chapter aims to characterize the air quality at Ilala Sub-projects 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)[viii].

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

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

TABLE 13 below presents the ambient air quality Tanzanian Standards and WHO Guidelines.

TABLE 13

AMBIENT AIR QUALITY STANDARDS AND GUIDELINES

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

Pollutant	Averaging period	Tanzania Standards in µg/m³ (ix)	WHO Guidelines in µg/m³ (7)(x)
			100 (guideline)
	1-year	10-100	---

(PROCESL/COWI, 2014)

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[xi].

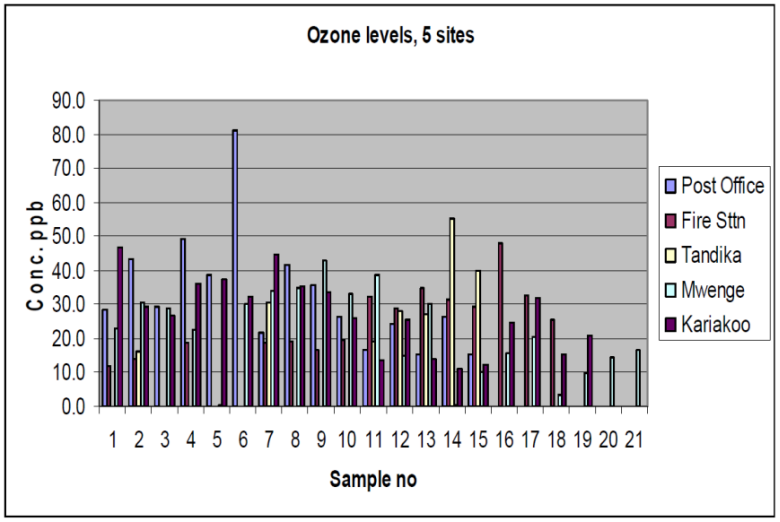
Urban Air Quality Monitoring has been undertaken as part of the Air Quality Monitoring Capacity Building Project (ARMCBP).

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 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.

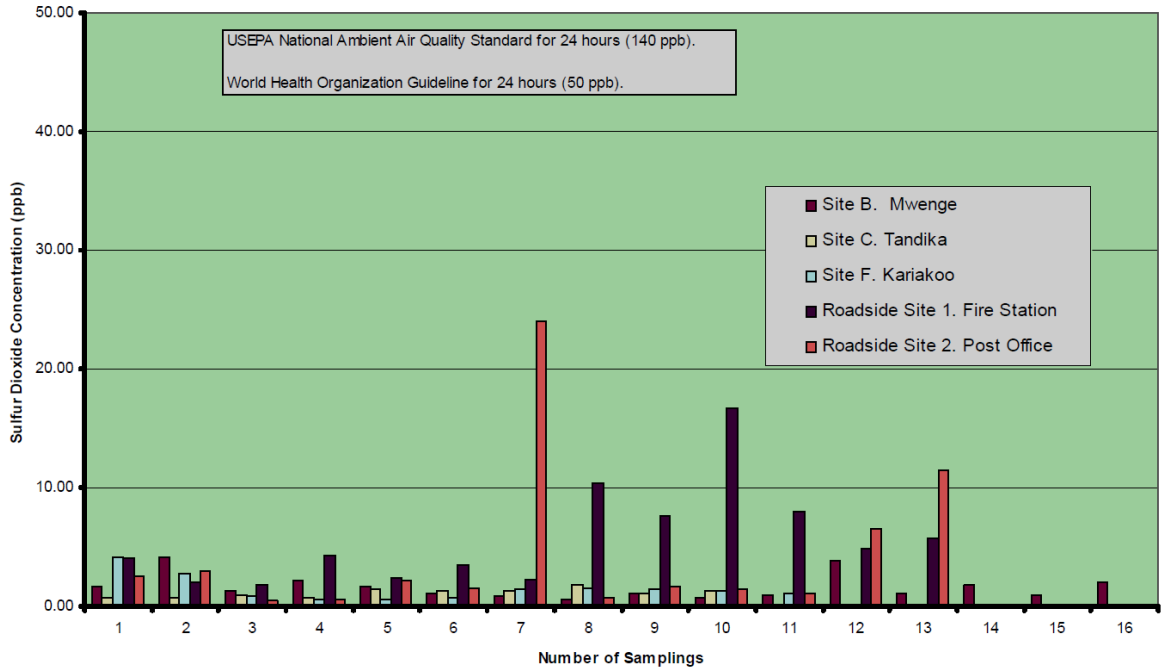
The following figures present the available obtained results.



(Adapted from AQMCBP, PROCESL/COWI, 2014)

FIGURE 15

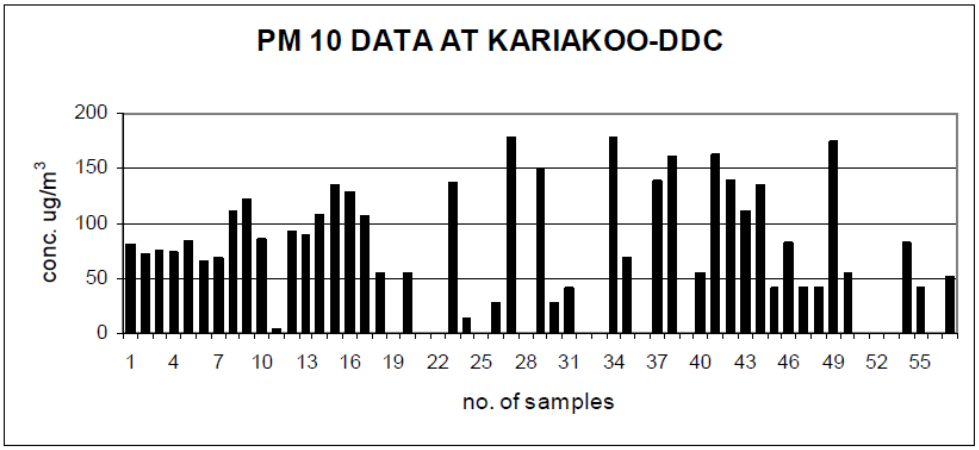
OZONE LEVELS



(Adapted from AQMCBP, PROCESL/COWI, 2014)

FIGURE 16

SULPHUR DIOXIDE CONCENTRATION



(Adapted from AQMCBP, PROCESL/COWI, 2014)

FIGURE 17

PM_{10} CONCENTRATION

Despite the distance from the study area, the Kariakoo site characterizes the project area best.

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 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 landscape of the area is flat relief dominated by few open spaces almost continuous and dense, extending significantly into surrounding areas, in an incoherent pattern. This artificial occurrence is observed all over the study area (**PHOTO 6**), except for within the first kilometres of IL5 intervention at Kisiwani, where the north part of the existing drain is occupied by a natural area (**FIGURE 18**).

(Field work, PROCESL/COWI, 2014)

PHOTO 6

TEMBO MGWAZA AREA

(PROCESL/COWI, 2014)

FIGURE 18

IL5 INTERVENTION AT KISIWANI

The areas of natural vegetation are scarce, except the north part of Kisiwani existing drains and Mpogo detention pond, vegetation patches are very artificialized, housing and impervious surface disseminated and roads limiting the movement of wildlife (**PHOTO 7**).

(Field work, PROCESL/COWI, 2014)

PHOTO 7

KIWALANI SURROUNDINGS

This lack of rationality in the distribution of housing poses serious functional problems, both in terms of municipal services and ecological balance.

Considering the above description of the municipality, the existing land use types in the project area are arable lands (at Kisiwani, where the north part of the initial existing drains of IL5 intervention is occupied by a natural area), urban areas with no vegetation (IL11 Mafuriko drains) or areas with some vegetation surrounding existing drains (IL10 Tembo Mgwasa) (**PHOTO 8** to **PHOTO 10**).

(Field work, PROCESL/COWI, 2014)

PHOTO 8

VIEW OF KISIWANI NATURAL AREAS

(Field work, PROCESL/COWI, 2014)

PHOTO 9

VIEW OF MAFURIKO DRAINS

(Field work, PROCESL/COWI, 2014)

PHOTO 10

VIEW OF TEMBO MGWASA

4.2.2 General wildlife (fauna)

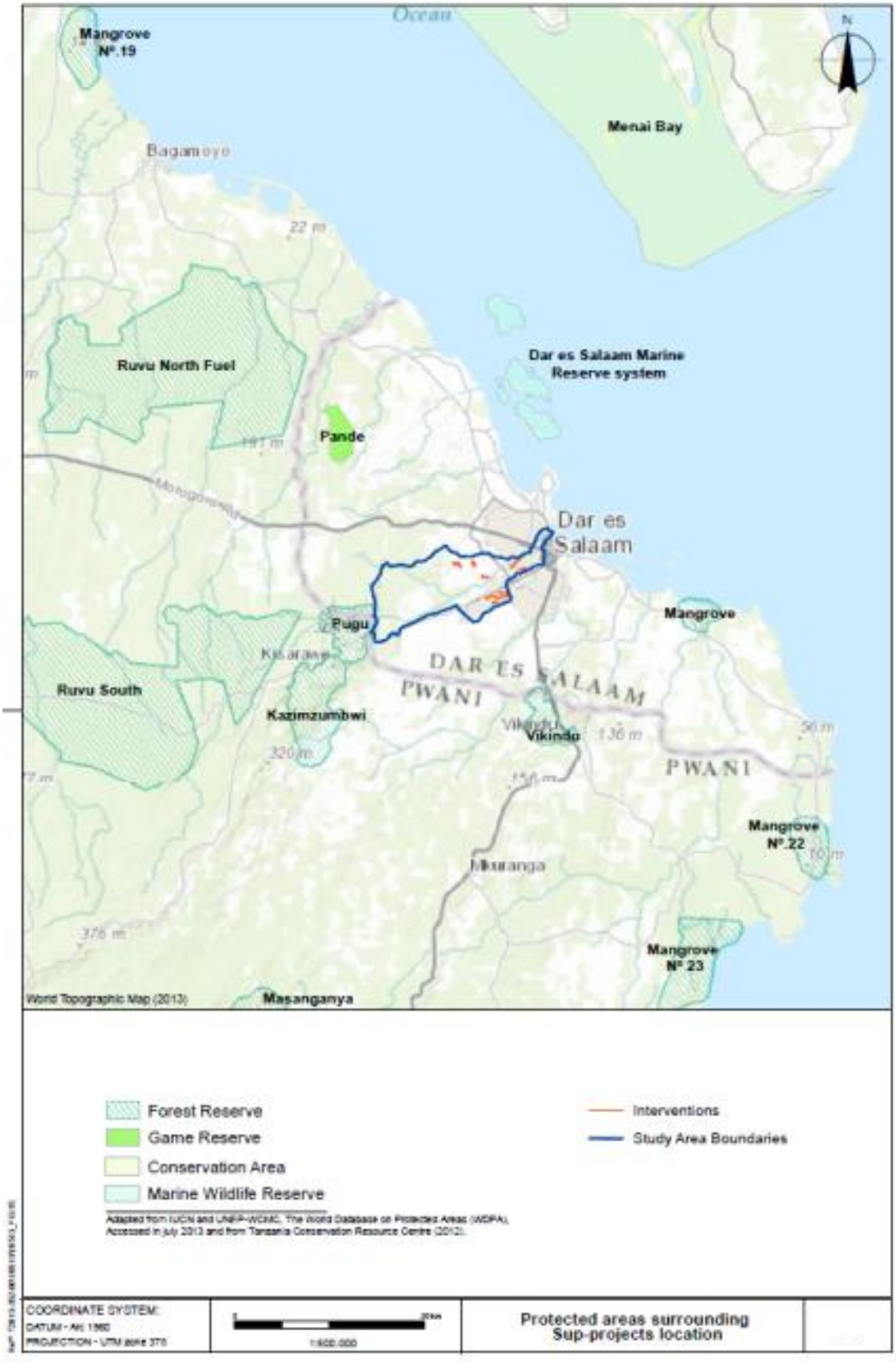
The main fauna found in the project area include domestic animals and some wildlife, predominantly generalist species that are tolerant of human presence such as house rats (*Rattus rattus*), common toads (*Amietophrynus gutturalis*), crows and sparrows. In summary, it can be said that the Sub-project areas have no remarkable wildlife resources.

4.2.3 Conservation status

Sub-project areas do 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 Pugu Forest Reserve, located 12 km SW of the study area (**FIGURE 19**).

Pugu Forest Reserve is a forest reserve in Pwani Region, located in the Pugu Hills area, near Dar es Salaam, adjacent to the Kazimzumbwi Forest Reserve. Together with Kazimzumbwi, Pugu Forest is part of what is considered to be one the oldest forests in the world. The area is characterized by a large number of endemic species of animals and of evergreen plants.

The Pugu Forest has 14 endemic plant species, two mammalian endemic species, and one endemic subspecies of birds. Wildlife include elephants, giraffes, impalas, warthogs, leopards, cheetahs, hyenas, pangolins, elephant shrews, mongooses, civets, galagos, jackals, baboons, hippopotamuses, colobuses, as well as over 80 species of birds. Lions used to live in the Reserve, but none have been reported in recent times. Some natural caves host large colonies of bats.



(Adapted from the Word Database of Protected Areas, PROCESL/COWI, 2014)

FIGURE 19

PROTECTED AREAS SURROUNDING SUB-PROJECTS LOCATION

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

The Northern Zanzibar-Inhambane Coastal Forest Mosaic ecoregion,along with the Eastern Arc montane forests together, harbor 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 mammal 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 occuring 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 are confined to forests. Butterflies are represented by 400 forest species, of which 75 are endemic.

There are also other different types of protected areas (commonly referred to as Greenbelt areas) within Ilala Municipality which include Recreational Gardens, Open Spaces, Wetlands and Woodlots. The comprehensive list is presented in **TABLE 14** below.

TABLE 14

PROTECTED AREA WITHIN ILALA MUNICIPALITY

Protected Area Type	Area	Location	Size (ha)
High Income Wards			
Recreational Gardens	Karimjee botanical Garden	Samora / Garden avenue	2,4
	Mnazi Mmoja No.11	Bibi Titi / Lumumba street	1,5
	Umoja wa Vijana	Msimbazi / Morogoro road	0,8
	Old Post Office	Sokoine / Kivukoni Sreet	1,0
	India / Samora	Samora / Aggrey street	0,8
	Co-cabs	Nyerere / Lumumba street	0,2
Recreational Gardens	Stesheni	Station / Sokoine Drive	0,4
	Mpilipili	Along Luthuli road	0,5
	Ocean road matunda	Luthuli / Garden avenue	1,5
	State House Grounds	Along Luthuli / Ocean rd.	2,5
	Mnazi mmoja no. 1&111	Bibi Titi / Lumumba street	6,0
	Barclays	Along Ohio street	0,8
	Kidongo chekundu	Makamba / Lumumba	1,5
	Mahakama ya Kariakoo	Lumumba /Morogoro road	0,2
	Mambo ya ndani	Ohio street	0,1
	Ilala ward Office	Uhuru road	1,5
	Jangwani Grounds	Morogoro road	20,0
Wetlands in surveyed areas	Buyuni - Chanika ward	Kata ya Chanika	180,0
	Kinyerezi Ward	Kata ya Kinyerezi	67,3
Woodlots	Kitunda ward	--	13,0
	Kinyerezi ward	--	4,5

4.3 FINANCIAL AND ECONOMIC BASELINE CHARACTERISTICS

4.3.1 Agriculture

Agriculture employs about 13% of the total population and is carried out in the undeveloped areas and urban fringes of Ilala Municipality which together, entails approximately 10,019 ha of land out of which food crops (7,201 ha) and cash crops (2,818 ha). Major food and cash crops grown are cassava, sweet potatoes, paddy maize, cash crops include cashew nuts, coconuts, citrus fruits, vegetables and fruits, such as amaranths, Chinese cabbage, eggplant, okra, kale, leek (matembele),

night shade (Mnavu), passion fruits, pawpaw, pineapples and mangoes. Horticulture activities are carried out in open spaces and in backyard gardens of the urban areas.

Most farmers depend on rain fed agriculture and irrigation on a small scale. Two small irrigation schemes have been established at Kidole and Zingiziwa, at Msongola and Chanika wards. At the moment Ilala Municipal Council is conducting a feasibility study for two irrigation water schemes at Mzinga River and Zogoali valley in Msongola and Chanika wards, which aim to increase agricultural production throughout the year.

4.3.2 Livestock keeping

Livestock keeping is mostly done for domestic consumption and trade e.g. poultry keeping. Major types of animals kept are dairy cattle (7,500), poultry (450,000), sheep and goats (2,700) and pigs (3,500). Zero grazing is mainly done in urban and semi urban areas of the municipality especially in Ukonga, Segerea, Kitunda and Kipawa wards (Livestock and Poultry).

4.3.3 Fish and fisheries

Fishing is among the important economic activities in Ilala Municipality. The major fishing market in Dar es Salaam, (the Kivukoni fishing Market) is located in Ilala Municipality.

4.3.4 Tourism

Tourism is currently one of the leading economic sectors in Tanzania and has an unlimited potential to contribute to the development of the country.

The most notable tourism sites in Ilala Municipality include the following::

National Museum: Built in 1940 by the British as *King George V Memorial Museum* which added the new building structure in 1963. The Museum houses exhibits on the history of Tanzania, marine biology and ethnography. It also includes the skull of Australopithecus Boisei found in 1959 in Olduvai Gorge by the late Dr. Leakey.

Nyerere Cultural Centre: situated next to the Royal Palm Hotel. Traditional art and paintings exposition are done including training of handicrafts for interested persons.

Colour Centre: situated along Samora Avenue where Muzu Sullemanji willingly shows his paintings and photos.

4.3.5 Mining

Mining activities are notably significant within the municipality. This includes the extraction of sand, coral, gravel stones/boulders, aggregates, limestone and salt. The latter is non-finite material while the former are finite which can be exhaustible. Thus, efficient extraction is essential for sustainability on existing mining and offers employment opportunities and income to local residents. Mining activities in the municipal are carried out under the provision of Mining Act No. 5 of 1998 and the mining regulations of 1999, which prohibits reconnaissance, prospecting or mining without mineral rights and without written consent from the relevant authority.

4.4 PHYSICAL AND INFRASTRUCTURAL BASELINE CHARACTERISTICS

4.3.6 Water supply, sanitation and waste management

WATER SUPPLY

Ilala Municipality has 304 wells which contain water that is suitable for human consumption. There are 170 deep wells of which 146 are in operation and the remaining 158 have stopped functioning due to technical problems. The wells which are in operation have the capacity of generating 1,231,439 liters which can serve up to 490,434 people per day. The availability of water supply in Ilala Municipality does not meet the actual demands. Deep and shallow wells only supply (2,058 L) which is 43% of the actual demand (4,770 L) of water supply in the municipality. Nevertheless, 24% of local residents in Ilala Municipality depend on tap water from lower and upper Ruvu River source.

SANITATION

Like other municipalities in Dar es Salaam, Ilala is characterized by poor sanitation conditions ranging from leaking sewerage water, stagnant water to poor toilet facilities. Most households have their own septic tanks and some hire companies to collect and dispose while others dispose traditionally (kutapisha vyoo).

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 conditions make 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 Sub-projects area. The effort of Ilala Municipal Council 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 a 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. The waste collection system in place has proven inefficient as it poses environmental and health hazards to the population.

According to the Municipal Solid Waste Management in Dar es Salaam, in preparation for the DMDP in the planned areas of the city, the municipal waste is collected from nearby households, commercial establishments, institutions and industry by either the DLAs or the private sector and taken directly to the Pugu dumpsite (**PHOTO 11**).

(Field work, PROCESL/COWI, 2014)

PHOTO 11

PUGU DUMPSITE

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

According to the same study, there is no current waste management practice in the unplanned areas of the city. Thus, the population disposes of their waste into drainage ditches, streams and by the

roadside. In cases where a large amount of waste is disposed, disease vectors for soil, water and groundwater pollution could potentially arise.

Ilala Municipality hosts the only authorized site in Dar es Salaam for the reception of solid non-hazardous wastes – Pugu dump site - which, although initially projected to meet the international norms for a sanitary landfill, does not fulfil any of its basic requirements.

Pugu is an open dump with waste spread across the 65 hectares without material coverage and with limited compaction performed. The normal operation is that a bulldozer spreads the waste across the site after being sorted by waste pickers. Open fires often burn across the site[xii].

Not including smaller, informal dumping sites used by residents in unplanned areas, three improper waste dumpsites have been closed in Ilala Municipality in the past two decades. These generated, and in some cases continue to generate, environmental concerns, namely:

- Tabata Ward – Closed in 1992, operated for approximately 25 years. Continuing leachate flows to area watercourse. Informal community has since been built over the site. Unknown risks to residents;
- Vingungui - Operated from 1992 to 2001 in a small site of approximately 6 hectares;
- Kigogo (Ilala / Kinondoni border) - Operated from 2008 to 2010. Adjacent to a floodplain. Evidence of leachate flows to area watercourse. Wastes continue to be dumped at the site. Limited cover material[xiii].

It was estimated that approximately 4,200 tons per day of solid waste were generated in Dar es Salaam in 2011 where, 1,088 tons in Ilala Municipality. It was also estimated that less than 40% of the total wastes generated in the city were appropriately collected and disposed of in designated dump sites. 60% of solid wastes were either dumped by the roadside or into drainage canals contributing to health problems for local residents, annual flooding events and methane generation. Thus waste management is a critical problem for the Municipal Council of Ilala. The council is vested with the responsibilities of removing wastes from public areas as well as from households (Local Government Town Authorities Act No. 8 of 1982 sect. 55 g).

Waste collection in Ilala Municipality is carried out through the following methods:

CURB SIDE COLLECTION

By this method trucks are employed to pick up wastes placed along the roadside curb. This method is commonly used in many neighbourhoods within the municipality.

THE POINT COLLECTION

The point collection takes place when solid waste is accumulated at one point and is later transferred to the major dumpsite.

RECYCLING

There is no formal system for recycling solid waste in Ilala Municipality. However, the private sector and community groups practice recycling which is mainly done by scavengers who move from one place to another collecting recyclable items. These are then sold directly or indirectly to the companies which recycle solid waste in large quantities such as plastics, paper and metal materials.

DISPOSAL FACILITIES/ DUMP SITES

For Ilala Municipality solid waste disposal facilities are located at Pugu Kinyamwezi within Ilala Municipality. The facility is managed by the Dar es Salaam City Council at a fee. The collected wastes are transported from collection points to the dumping facility by municipal trucks or contractors.

CHALLENGES

The major challenges facing the Ilala Municipal Council in implementing activities related to waste management include the following:

- There is not enough support to private sector and community organizations dealing with waste collection;
- Long distance allocated dumpsite which causes high operational costs and reduces collection capacity;
- Willingness of community to pay for costs related to collection and transportation of waste from their communities;
- Central government does not subsidize waste collection activities which consume significant amount of money from municipal revenue[xiv];
- Inadequate solid waste collection trucks, equipment and tools. Currently there are only 10 solid waste collection trucks in the municipality[21]. Among these vehicles, two trucks are in good working condition (new) while the remaining eight trucks are very old which require regular costly maintenance;
- Lack of specialized equipment and tools.

TABLE 15 below shows demand and current status of solid waste production in Ilala Municipality.

TABLE 15

WASTE PRODUCTION

Ward	Population	Waste Tonnes Produced
High Income Wards		
Kivukoni	6,612	23,8
Mchafukoge	15,866	18,69
Kisutu	8,720	17,3
Upanga Mashariki	10,118	23,9
Upanga Magharibi	12,685	31
Middle Income Wards		
Jangwani	21,539	17,23
Kariakoo	12,885	89,4
Gerezani	7,671	13,5
Mchikichini	26,664	34,6
Ilala	32,799	64,2
Low Income Wards		
Buguruni	91,829	127,7
Tabata	63,333	96,5
Segerea	103,875	83,1
Kinyerezi	7,961	13,7
Vingunguti	94,425	77,9
Kiwalani	84,885	67,91
Kipawa	67,755	88,2
Kitunda	32,096	50

4.3.7 Transport and telecommunications

Public transport system mainly consists of passenger buses called *daladala*, motorcycles (locally known as *bodaboda*) and private taxies. There are approximately 7 000 registered and privately owned *daladalas* providing services within and outside of the municipality. The government owned parastatal (Usafiri Dar es Salaam - UDA) - a onetime public transport giant in Dar es Salaam currently operates only (approximately) 30 buses, in and out of town routes with a total aggregate seating capacity 1 300.

The municipality is readily accessible by road, air and water transportation. The road network hierarchy can be defined as truck, district and feeder roads. The Municipal road network is 695 km in length, of which 115 km are tarmac roads, 277 km are gravel roads and 646 km are of earth standard. The municipality can easily be accessed by road from different directions. The internal roads facilitate different traffic movements within and outside of the municipal territory despite only 33% of municipal roads being in good condition. The most common modes of transportation

within municipality are *daladala*, Try-cycle (commonly known as *gutas*), motorcycles, interregional buses, trucks and lorries.

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.

All four major telephone companies (Vodacom, Celtel, Tigo and Zantel) are operating in Ilala Municipality and established corporate headquarter offices in Ilala, except for Zantel. There are other small private telecommunication companies which cater services ranging from internet, faxing, printing, typing, etc. within the municipality.

4.5 SOCIO-CULTURAL BASELINE CONDITIONS

4.5.1 Administrative aspects

Administratively the Municipality of Ilala is the regional headquarters for Dar es Salaam Region, made up of three Divisions, which are subdivided into 26 administrative wards which are further subdivided into 101 "*Mitaa'.* In this context, Ilala Municipal Council has three constituencies made up of Ilala, Segerea and Ukonga.

THE COUNCILLORS

The Council is led by 40 councillors. The Lord Mayor is the Chairman of the Council and is assisted by a Deputy Mayor. The council is a legal entity which makes decisions by standing committee meetings and Full Council.

THE EXECUTIVE SIDE

The Executive side of the Council is headed by the Executive Director who supervises the daily operations of the council .The Chief Executive of the Authority is closely assisted by nine heads of Department.

4.5.2 Social characteristics

ETHNIC COMPOSITION

The main native ethnic groups in Ilala Municipality are Zaramo and Ndengereko but due to urbanization many people of different ethnicity have migrated and made heterogonous tribal

composition whereby, no single ethnic group accounts for more than 25% of the total population. Ilala is the most affected area in the City due to its status of being a hub for socio-economic activities and other interactions. The rapid economic growth of the city also attracts an influx of people from different corners of the country and outside the country.

SETTLEMENTS

Ministry of Lands and Human Settlement Development in collaboration with the municipal council are responsible for proper allocation of land plots for housing development. Yet over 70 percent of Dar es Salaam residents live in informal and unplanned settlements that lack adequate infrastructure and services. Over half of these residents survive on less or one dollar per day. With a population growth rate of about 8 percent per day, Dar es Salaam is one of the fastest-growing cities in sub-Saharan Africa with approximately 5 million people.

MIGRATION

Ilala is facing a problem of shifting population where the majority of Dar es Salaam citizens spend their day within Ilala Municipality and reside in other municipalities[xv]. Ilala Municipality always seemed to have small population compared to Temeke and Kinondoni councils. However, the municipality serves the larger population of Dar es Salaam due to the existence of many economic activities such as manufacturing industries, banking, private and government offices, public institutions, NGOs etc. Nevertheless, Ilala faces the problem of inadequate social services such as water supply, electricity etc. and suffers from environmental pollution due to the rapid growth of population and limited capacity of social services to support the growing population.

HEALTH SERVICES

Municipal council health delivery system follows the national pyramid system. The municipality has only two levels of health care service delivery. Level 1 consists of Health Centre, Dispensaries and affiliated clinics delivering preventive and curative health services and Reproductive and Child Health (RCH). Level 2 entails the Municipal Hospital (Amana) which delivers preventive and curative second line services such as RCH paediatrics and obstetric services. Outpatient, inpatient, investigation services and health promotion are integrated in a routine activity through outpatient services. The number of health facilities and existing conditions (at ward level) are discussed below.

BANKING

There are many commercial banks within Ilala Municipality including NBC Limited, National Microfinance Bank (NMB), CRDB, Barclays, BARODA, BOA, Standard Chartered and Exim

Bank which offer financial services such as current and savings accounts, foreign exchanges, as well as loans.

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.

4.6 SOCIO-CULTURAL BASELINE CONDITIONS – WARD LEVEL

Tabata

Residents of Tabata are mostly engaged in small business – mostly traders - and others are formally employed. Water supply is available through DAWASCO connection (piped water), deep and shallow wells at household and sub-ward level. A deep well is being drilled at Msimbazi Street as the current development project. Residents in the project area use permanent septic tanks and they hire private sewage disposal companies to collect and dispose. Solid waste is collected by 6 CBOs in Tabata ward, 1 for each street. CBOs (community based organizations) sweep, collect and deposit the trash at assigned points for a minimum wage where the Municipal agency comes to collect and transport to the dumping sites. There are several health improvement initiatives including voluntary testing and counselling funded by the government as well as training HIV/AIDS committees at ward levels by the government.

Buguruni

The majority of residents are self-employed. Some are running small businesses and others are in formal employment. The households in Buguruni have septic tanks and few are connected to the sewerage system by DAWASCO. There are 4 CBOs (1 for each mtaa) in Buguruni ward. CBOs sweep, collect and deposit the trash at designated points where the Municipal agency comes to

collect and transport to the dumping sites. There's a contractor who cleans the roads and collects the litter along the roads. Buguruni has no ongoing water projects. There is no piped water within the ward. The main water source in the ward is through wells. Buguruni ward has the total of 27 wells: 10 Government owned wells and 17 privately owned wells.

There are several initiatives in Buguruni including PASADA (NGO) that educate and sensitize the community on HIV/AIDS as well as conduct voluntary testing often. There are 4 ward level HIV/AIDS committees and 1 Mtaa level committee who coordinate and organize awareness raising and facilitation within the communities.

Kiwalani

Residents of Kiwalani are mostly engaged in small business. There is no piped water in Kiwalani ward. BTC are working on drilling a deep well to be completed by the first half of 2015. DAWASA built a deep well at Yombo Street which is being improved and maintained by the Yombo Community of Water Users. The municipal is working to implement clean and safe water spots at primary schools in Kiwalani ward. There are 78 shallow wells that are privately owned whereas the government owns 6 wells in total.

There is no formal sanitation system in Kiwalani ward. Most households have their own septic tanks and some hire companies to collect and dispose while others dispose traditionally (*kutapisha vyoo*). The municipal is responsible for collecting and disposing of the solid waste in Kiwalani. The two tarmac roads along the ward are catered for by a private contractor (K.M. Environmental) whose responsibilities include; sweeping the road weekly, removing piled up heaps of sand, cutting the grass and collecting garbage by the road and at factories. CBOs collect garbage from households. The municipal has a program of funding HIV/AIDS Ward committees for organizing and facilitating sensitization and voluntary testing. In Kiwalani, PASADA together with RC dispensary Kiwalani give counselling, testing and they provide Anti-Retroviral medication (ARV) for free. St. Carmelius (NGO) facilitates peer education about HIV/AIDS.

Segerea

Residents of Segerea are predominantly government and formal sector employees; others are engaged in small businesses. There is no piped water within the ward. The major water sources are wells. There are 7 government owned wells and 60 private owned wells (household level). Most of the wells at households are not deep wells. The government caters for sanitation needs at the government schools; this includes hiring private sewage disposal companies to collect and dispose. Households have septic tanks which reserve the sewage waste and companies are hired to dispose

of this waste. The main tarmac road is cleaned and the litter is collected by a CBO named AMKA, they cater for the road space between Magenge and Magereza. Each Mtaa has a CBO that collects and takes the garbage to a collection point where the municipal gathers and dumps at the designated sites. There are 5 CBOs at Segerea ward. In Segerea, the municipal funds the sensitization activities as well as conducts voluntary testing, the Ward committee organizes and coordinates these events.

Ilala

Residents of Ilala are predominantly government and formal sector employees; others are engaged in small businesses. Households in Ilala cater for their own sanitation needs through local companies who collect and dispose of sewage waste. The Municipal collects and disposes the trash. There are two private companies responsible for collecting trash from households and streets. In Ilala, DAWASCO is improving piped water systems. There are 8 functioning deep wells built by the Municipal. In Ilala MDH organizes and coordinates sensitization, voluntary testing and peer education.

TABLE 16

SOCIAL SERVICES IN PROJECT AREA

Municipal	Ward	Schools		Health services		Markets
		Primary	Secondary	Private*	Public	
Ilala	Tabata	7	5	4 Dispensaries 2 Health centre 2 Clinics	2 Dispensaries	TBD
	Buguruni	7	0	3 Dispensaries 3 Health centres	1 Health centre	TBD
	Segerea	12	7	7 Dispensaries 1 Health centre 1 Clinic	1 Dispensaries	TBD
	Kiwalani	7	1	6 Dispensaries	2 Dispensary	TBD
	Ilala	10	2	1 Hospital 9 Dispensaries	1 Hospital	TBD

(consultations with respective WEOs, PROCESL/COWI 2014)

TBD- to be determined

* Private health facilities include those that are privately owned, faith-based and parastatal.

TABLE 17

DEMOGRAPHIC PROFILE OF PROJECT AREA

Municipal	Ward	Population	
		Male	Female
Ilala	Tabata	35,909	38,833
	Buguruni	34,547	36,038
	Segerea	40,065	43,250
	Kiwalani	40,247	42,045
	Ilala	15,242	15,841
	TOTAL	**166,010**	**176,007**

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 Mpogo River valley. 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.

Affected Assets

The project will affect the following compensable assets:

- 330 households
- 7 Medium size commercial businesses
- 1 plot of government-owned institutional land
- 2 retail shops, and 30 areas with urban husbandry or agriculture
- 18 electrical poles and 0 water main pipes.
- 59 pit latrines
- 43 fences/ walls
- 5 boreholes
- 9 chambers / sceptic tanks
- *Crops: 486 seasonal crops, 1496 permanent crops and 272 indigenous/shade trees.

NB:

Seasonal crops are defined as follow:

Fruits (seasonal e.g. papaya, watermelon, pineapple) and vegetables e.g spinach, callaloo (mchicha)

Permanent: Food crops (e.g. maize, banana, cassava, potatoes, etc.) and Commercial crops/trees (coconut, mango, cashew, avocado etc.)

Trees: Shade/wood/Indigenous trees

CHAPTER 5.0: STAKEHOLDERS IDENTIFICATION AND METHODS OF PARTICIPATION

5.1 INTRODUCTION

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

This process provides an opportunity for all Interested and Affected Parties (IAP) 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 into the design process;
vi. To inform surrounding communities on the objectives of the project;
vii. To provide the design team with expert opinion on the main issues and problems which are necessary during project implementation;
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 ADAPTED 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 light of this process the following stakeholders were identified;

- Ministry of Works
- Ministry of Water

- Ministry of Lands and Human Settlement Development
- Dar es Salaam regional Commissioner Office
- Ilala Municipal Council
- Local People
- Local Leaders
- Business Vendors
- NGOs & CBOs
- Religion Organization
- Peer groups
- Political parties
- Micro Finance Organization
- DMDP
- TENESCO
- 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. Stakeholder analysis helps to determine the key actors of the project and those who are less involved but have an interest in the project. The table below shows the type, level and functions of each stakeholder in relation to the project.

TABLE 18
STAKEHOLDERS ANALYSIS

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
		Ilala Municipal Council	Among other important function of Municipal councils is to Formulate	✓		Consulted	The project falls under its jurisdiction

TABLE 18
STAKEHOLDERS ANALYSIS

N	Level	Stakeholder's Name	Major Functions	Key Stakeholder	Minor Stakeholder	Consulted	Comments/ Description
			coordinate and supervise the implementation of all plans for economic and social development in their areas of jurisdiction.				
3.	Ward & Mtaa	Local People	Community Members	✓		Consulted	Affected people; main project stakeholders
		Local Leaders	Community Members	✓			Community leaders and affected by the project
		NGOs & CBOs	Non-Governmental Organizations	✓		To be 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
4.	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 services to Dar es Salaam and its	✓		consulted	Clean water service provider in the community

TABLE 18
STAKEHOLDERS ANALYSIS

N	Level	Stakeholder's Name	Major Functions	Key Stakeholder	Minor Stakeholder	Consulted	Comments/ Description
			satellite towns of Bagamoyo and Kibaha..				
		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
5.	International Organizations	The World Bank	Project financier	✓		Consulted	Project Financier

(PROCESL/COWI, 2014)

5.3.3 Stakeholders 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 the 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
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 responsible 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.

Besides PMO-RALG and World Bank, representatives from the ministries and municipalities involved also attended this meeting.

Phase II Consultation Results

- Following this meeting, it was clear that stakeholders involved were concerned about the occupation of the detention pond area.
- Mrs Faeda Magesa (Environmental Management Office from Ilala 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 the Ministry of Lands, Housing and Human Settlements Development recommended that the design should always use the natural streams, and emphasized the importance of the social component in the selection 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. The construction of retention ponds in non-polluted areas instead of a detention pond was also suggested, as the former would promote the recharge of aquifers.

- During the project development a number of utility institutions/companies, (DAWASCO, TANESCO, TTCL and TPDC) have been contacted in order to identify possible links between existing underground utilities and the proposed interventions.
- TPDC (Tanzania Petroleum Development Corporation) has provided their digitalized infrastructure plan – Gas network (PANAFRICAN 585/PAET/500/025 drawing – Dar es Salaam Natural gas distribution System, rev. N. Dated 21.09.13).
- TANESCO (Tanzania Electric Supply Company) has not been able to provide a digitalized infrastructure plan of their utilities. TANESCO has verbally informed that they do not have significant underground infrastructure in the areas of the proposed interventions. They further informed that overhead infrastructure is easily identified on site and can be dealt with during construction.
- DAWASA/DAWASCO (Dar es Salaam Water and Sewerage Authority/Dar es Salaam Water and Sewerage Corporation) and TTCL (Tanzania Telecommunications Company Limited) has not been able to provide us with digitalized infrastructure plans of their utilities. Both companies have informed that they will assist in on site utility identification and coordination of possible interactions during construction.

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 the month of October 2013 and involved meetings, discussions and interviews with local government officials from Ilala Municipal Council, DAWASCO, DAWASA and TANESCO as shown in table below.

TABLE 20

STAKEHOLDERS CONSULTED

Name	Institution	Jurisdiction Area	Position
Fadhili Eliahr	DAWASCO	Ilala	Area Engineer
Ogare Salu	Municipal Council	Ilala	Municipal Engineer
Kasim M.K.	Municipal Council	Ilala	Road Engineer
Mathias Mlagambwa	DAWASA	Dar es Salaam Area	Engineer
Eng. Chacha	Municipal Council	Ilala	DMDP Coordinator
	Municipal Valuer	Ilala	Ilala Municipal Council
	Local Government	Ilala	WEO - Respective Wards

Phase III Consultation Results

Major issues raised by stakeholders during this phase are presented in the tables below:

TABLE 21

MAJOR ISSUES RAISED BY TANESCO

Issue Raised
The main issues of concern reiterated by the TANESCO regional manager were as follows: 1. Problems and challenges Most unplanned settlements have limited spaces for construction of roads and installation/placement of electrical infrastructure facilities. Vandalism, 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 of copper and metals such as electrical cables. Costs of Moving /Relocating Infrastructure Facilities The company has limited funds for relocation of 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 for 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 new connections to be established and power lines into these neighbourhoods. 2. 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 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 scraps to authorised dealers.

(PROCESL/COWI, 2014)

TABLE 22

MAJOR ISSUES RAISED BY DAWASCO ILALA

Issue Raised
Consultation with DAWASCO Ilala acting manager was conducted on October 15th 2013. The main issues raised were as follows: Water Leaks from main water supply pipes According to the manager, water leaks from main water supply pipes in many unplanned settlements are a common problem experienced by many customers. However he mentioned that many water leaks are caused by either corrosion, limited services and improper connection by some individuals. Increasing water demand 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 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 a daily basis. Corporation with other Utility Agencies Timely execution of civil works with other utility agencies such as TANESCO, TANROADS (Roads agency) and municipal council is difficult to be implemented since each agency has its own budget, work plan and goals for a specific period of time. Thus, simultaneous execution of works related to water supply, electrical power supply and sewerage will be complex and difficult to implement. Billing and Service Follow-up It is difficult to follow up repair 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: Infrastructure vandalism According to the DAWASCO manager, many water supply pipes are being detached from water meters to distort readings of actual amount of water used per month period. Unpaid bills Unpaid bills lead to weaker financial position of the agency and hence poor services and maintenance. Illegal connection Many areas are characterized by illegal water connections which is a common phenomenon in many parts on 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 a legal mandate to instruct users on how to handle waste /sewerage from households 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 of water to facilitate the draining of sewerage leading to a blockade of sewerage in many parts of Dar es Salaam. Vandalism of facilities As with water and power supply facilities, DAWASA is faced with sabotage 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 scrap vendors who will then sell to recycle centres where the materials are melted 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 sewerage overflow can be observed in many parts of the city and in unplanned settlements. The role of DAWASA is to collect and transport sewerage on a contractual basis from households that subscribe to the services. Measures taken DAWASA has started a vigorous campaign trying to educate people on the effects of health and safety within the community caused by vandalism of sewerage infrastructure facilities, especially storm water covers. An awareness education campaign is planned to be aired by Radio Clouds on a weekly basis. Other measures include legal procedure such as court appearance and fines according to the laws of the country.

(PROCESL/COWI, 2014)

TABLE 24

MAJOR ISSUES RAISED BY MUNICIPAL ENGINEER

Issue Raised
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 Strict 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 other public lands.

TABLE 25

MAJOR ISSUES RAISED BY MUNICIPAL ENGINEER (CONT.)

Issue Raised
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 vandalism, 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 the construction period such as digging trenches for water supply pipes and road construction on the same locality. Education Campaign According to the 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 at the Ward and Mtaa levels 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 opinions 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.

Name	Jurisdiction Area	Institution	Position
Mahu S.L.	Ilala	Ilala MC	HRO
Mbarouk Msoud	Ilala	LGA	MEO
Doroth Chale	Ilala	Ilala MC	HRO
Justine Nyangwe	Ilala	LGA	WEO
Emmanuel Leonard	Ilala	LGA	WEO
Adeltus Kazinduki	Ilala	LGA	WEO
Herbert Haule	Ilala	LGA	MEO
Nahshon E. Marwa	Ilala	LGA	WEO
Zephania Sospeter	Ilala	Ilala MC	QS
Hellen Ryatura	Ilala	Ilala MC	Councilor / Diwani Kamanga
Edson N. Fungo	Ilala	Ilala MC	Councilor / Diwani Ilala
Ubaya Chuma	Ilala	LGA	MEO

Huba R. Possy	Ilala	LGA	MEO
Magina F. Lufungilo	Ilala	Ilala MC	Councilor / Diwani
Riogasian Seda	Ilala	Ilala MC	MEPO
Renatus Macharu	Ilala	Ilala MC	Economist

HRO = Human Resource Officer; WEO = Ward Executive Officer ; MEO = Mtaa Executive Officer
QS = Quantity Surveyor; LGA = Local Government Authority

(PROCESL/COWI, 2014)

Phase IV: Results of Public Consultations

Issues raised during sensitization meetings in Ilala:

- **How long will the valuation exercise last?** People want to continue with building and other development activities have been halted. The DMDP coordinator indicated that he is not sure how long the process will take as it depends on the Consultant's valuation team. He urged residents to be patient. The Municipal Valuer also pointed out that the valuation process will take time.
- **Can the people continue staying in the properties after valuation?** The Municipal Valuer indicated that even after valuation, PAPs will continue staying in their properties until they are compensated. Compensation shall involve a three years rent and a person will be allowed to salvage whatever he/she can from his/her property.
- **Who is responsible for compensation payments – is it the World Bank or LGAs?** The Ilala DMDP coordinator pointed that it is the respective Municipal council.
- **Compensation will be based on which legislation?** The Municipal valuer pointed out that Land Act of 1999 will be used. Whether a person is fully or partially affected will be determined on site.
- **If the drainage channels go to Msimbazi River, what precautions have been taken to mitigate the effects of construction activities to those living near adjacent to the river?** The Ilala DMDP coordinator pointed out that the drainage channels will be constructed on Msimbazi River itself without causing any harm to bordering areas.
- What will be the quality of the drainage channels? The DMDP coordinator pointed out that the government hopes the channels will be built using concrete.
- **How can the government assure the residents of Ilala Municipal that the drainage channels will go to Msimbazi River?** Ilala DMDP coordinator assured the residents that

the channels will go to Msimbazi River due to the speed of the water flow. When asked about the speed, the DMDP coordinator pointed that it is a challenge to indicate the speed.

- **How long will the construction take place?** Ilala DMDP coordinator pointed out that the duration is yet to be known. Construction will start after a tender for construction is issued and contractor is selected.
- **What about the drains that are not covered by the surface water drainage sub-project under DMDP?** The Ilala coordinator pointed out that the selected drainage channels were based on priorities. When funds will be available, other areas will be covered as well.
- **How are the LGAs prepared for paying compensation?** Ilala DMDP coordinator pointed out that the Ilala Municipal Council has set a special fund for valuation. Whether there are sufficient funds for paying compensation depends on the valuation of properties and assets to be affected. The Ilala Municipal Valuer also stressed that the government is waiting for COWI's valuation report so that it can set aside money for compensation.
- LGAs representatives pointed out that there is a need for engineering drawings to be available in ward offices.
- **Which locations will be first in placing pegs for clarifying the corridor of impact?** A COWI representative pointed that he cannot be sure of exact location since that will depend on office logistics. He also pointed out that information on where and when will the pegs be placed will be communicated to residents through their local government.

CHAPTER 6.0: IMPACT IDENTIFICATION AND ASSESSMENT OF ALTERNATIVES

6.1 IMPACT ASSESSMENT

The approach used in the impact identification also took into account the Core Impact Area (CIA), the Immediate Impact Area (IIA) and the Area of Influence (AI). The CIA includes 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.

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 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.

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.

TABLE27

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;
- 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

a. Local employment opportunities;

b. 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 on 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 Potential Impacts During Mobilization Phase

POSITIVE IMPACTS

i) Local employment opportunities

During the mobilization phase the project will create jobs for 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 the mobilization phase will be associated with the mobilization of construction equipment and machinery, including vehicles, bulldozers, excavators, concrete vibrators, generators etc.

All impacts expected to occur during the 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 at 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 a loss of vegetation cover and a 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 follows:

- Creation of jobs for local people, thereby improving the quality of life for workers and their families; between 150 to 250 will be needed.
- Creation of opportunities for the provision of services and supply of materials for small businesses;

- Transfer of skills to local workers, thus enabling them to apply these in future similar or related activities to promote socio-economies of their households.

NEGATIVE IMPACTS

Impacts arising from the Infrastructure Upgrading in Unplanned Settlements Sub-projects under the DMDP occurring in the area of Il 3 intervention ant Kigilagila are expected 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

Transportation and storage of aggregates and earth materials will likely result in dust pollution if preventive measures will not be taken. The 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 will likely result in the 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 flood events 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, paper and household 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 the construction phase, the 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 cause an increased exclusionary effect on the fauna community, particularly mammals, and enhance 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 relating to the construction phase is land take for improvement/rehabilitation of surface water drains in Ilala Municipality and the detention pond. 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.

ix) Traffic accidents

During the construction phase, there may be a potential risk for increased 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 poor management of traffic and vehicles associated with speeding.

x) Disruption of service utilities

There is the potential risk for the disruption of service utilities of water/power during works causing inconvenience 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 the 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 the HIV/AIDS pandemic and other social diseases during the construction phase due to geographical characteristics of the Project area. These can influence the high infection rate and sabotage 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 the subsequent loss of working force or creation of parentless children (orphans).

Measures should be taken to raise awareness among workers about STDs, HIV and AIDS through education promotional 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 carrying over 60 diseases and eco-parasites transmittable to humans and animals. These diseases can be transmitted easily 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 neighbourhoods 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 runoff is usually not an environment that is conducive to accommodating mosquitoes in sufficient numbers to cause a health risk problem.

Finally, the main effects on occupational health during the construction phase are wound/infections resulting from bites 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 site 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, the project proponent must put mitigation in place including providing clear instructions, safety measures, provision of safety gear, raising awareness and 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 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.

The expected positive impacts can be summarised as follows:

- Reduction of flooding during the rainy season and consequently reduced water-related diseases such as malaria, cholera, etc.;
- Safer and more sustainable storm water drainage system in the Municipality of Ilala;
- 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 that this impact will be cumulative to the ones resulting for these sub-projects implementation leading to an 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 poorly 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 the 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 improving 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, stagnant rain waters may lead to bird- and pest-related diseases resulting in disease vectors with the potential to affect the health of people within the community.

The detention pond will present a unique environmental or water quality challenge. This pond, 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 heavy rains on the detention pond, especially sensitive groups such as children and elderly.

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	Local	Short Term	Likely	Medium	Moderate
Surface water pollution	Negative	Direct/ Cumulative	On site/Local	Short term	Likely	Low	Minor
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

Impact	Type of impact						Significance
	Nature	Effect	Extent	Duration	Likelihood	Magnitude	
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/	Temporary	Likely	Medium	Moderate

Impact	Type of impact						Significance
	Nature	Effect	Extent	Duration	Likelihood	Magnitude	
			local				
Risk of drowning for the population during heavy rains	Negative	Indirect	On site	Temporary	Likely	High	Major

(PROCESL/COWI, 2014)

6.2 PROJECT ALTERNATIVES

In the development of 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.

To achieve a technically, environmentally and socially sustainable drainage design for the improvement of the drainage system in Ilala Municipality several study analyses were conducted as part of the preparation of several reports that allowed for the preferred options under which the final project design was prepared to be concluded.

The reports are as follows:

"Part 4 – Yombo River Basin Interventions - Kigilagila/ Minazi Mirefu/ Kiwalani areas and Mpogo River - 4.0 - Definition and Comparison of Solutions to Adopt (November 2013)

The comparative assessment was undertaken in this report between the following two alternatives:

- Alternative 1: Inclusion of a detention pond in the upstream section of the Mpogo River and implementation of selected interventions along the watercourse to widen and/or improve the river to meet the necessary hydraulic requirements.

- Alternative 2: No inclusion of a detention pond in the upstream section of the Mpogo River but, instead, the implementation of selected interventions along the watercourse to widen and/or improve the river to meet the necessary hydraulic requirements.

The analysis conducted in the Report concluded that Alternative 1 offered the best option both in terms of lowest construction cost and through reduced impact on people and property.

Whilst the accuracy of the cost estimate was limited by the lack of a detailed topographic survey model from which to extract precise quantities, the cost differential between the options was close to a factor of 10. This not only clearly emphasised the fact that Alternative 1 was significantly cheaper than Alternative 2, even allowing for revised costing as more detail becomes available, but it also indicated just how significant the inclusion of a detention pond is to this Sub-project.

Similarly, the extent of channel widening required to accommodate the peak flow without the throttling effect of the detention pond resulted in a large disparity on the second significant comparator, with 40 more properties requiring demolition. This was almost five times that required to accommodate Alternative 1.

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

Taking into account the conclusions of the previous reports allowed for the analysis of the preferred alternatives to be developed and meant that with the preliminary design could begin. The analysis of the preferred alternatives, at this stage, considered only the "*Project implementation*" and the alternative "*Do Nothing*" approach under the development of other two (2) reports:

- **"Part 2 – Msimbazi River (IL5/IL8/IL10/IL11) - 2.1 – Preferred Option Analysis; 2.2 – Preliminary Design" (March 2013);**
- **"Part 4 – Yombo River Basin Interventions (Kigilagila/Minazi Mirefu/Kiwalani areas and Mpogo River) - 4.1– Preferred Option Analysis; 4.2 - Preliminary Design" (March 2013).**

In both reports it was concluded that the "*Project implementation*" option was preferred to the "*Do Nothing*" one. The "*Do Nothing*" alternative implies that the storm water drainage in Ilala Municipality will not be improved at all. Current drainage conditions are already resulting in 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 flood events will continue to damage the individual properties, hence perpetuating poverty in the area.

As a result of the previews analysis the "*Project implementation*" alternative was considered to be the best alterative option and considers the interventions presented in chapter 2.0.

Nevertheless, the considered interventions presented some environmental and social constraints that are analysed in the present EIA, such as:

- IL 5 intervention maintains the existing alignment of the natural stream, not changing significantly the people in contact with it and the vicinity in which it is located;
- IL8 intervention maintains in general the existing alignment of the natural drains/stream, not altering significantly the people in contact with it and the vicinity in which it is located. The

new underground infrastructures to be implemented, even after moderately disrupting the lives of the people during construction, are not apparent after their conclusion.

The construction works will temporarily interrupt vehicular traffic on the existing road and prejudice the access to some residential areas but the timely reconstruction of pedestrian crossings will solve this problem;

- IL 10 intervention maintains almost all the existing natural alignment of the streams and opens drains/natural streams, not altering them but only enlarging part of them, nor altering significantly the people in contact with it and the vicinity in which it is located.

  Additionally, new underground complementary infrastructures are proposed, which, after construction do not generate any impact on the local population. The construction works will temporarily interrupt and prejudice the access to some residential areas but the timely construction of temporary pedestrian crossings will solve this problem;
- IL 11 maintains the existing drainage infrastructures, complementing them with new buried pipes and concrete frames, without significantly affecting the people in contact with them.

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

- Immediately replace the soils removed when the opening trenches;
- Ensure cleanliness and proper maintenance of ditches and all river extensions;
- Store a layer of topsoil 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 matter 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 compromise 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, along the banks and beds of water lines as well as in 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 matter 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;

- The flow of muddy water or uncontrolled discharges from the work areas (including washing) for the adjacent water courses and/or water bodies should not be permitted;
- 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 the 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

- Re-vegetate affected areas with some indigenous species to prevent erosion and to provide a practicable 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 replaced 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 community must be given early notice about the interruption of services;
- The need for temporary site drainage during the construction phase should be considered;
- Notify, in advance, the 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 the 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 promotional 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 camps 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 removing 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 constructed 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 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;
- 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

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

ii) Surface water pollution

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

- Ensure clearing of all components of the storm water drainage system;
- Ensure regular inspection of the storm water drainage;
- The removal and proper disposal of the accumulated sediments in the detention pond;
- Remove unwanted vegetation especially on embankment (when applicable) in the detention pond;
- Clean out clogged outlet and drainage system in the detention pond.

iii) Soil pollution

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

iv) Emergence of bad odours

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

v) Damages to nearby properties and infrastructures

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

vi) Transmission of diseases

- Ensure clearing of all components of the storm water drainage system;
- Ensure 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

- Display warning signs, erect barriers, and take other precautions in 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 Ilala Municipal Council in collaboration with the local communities. The Ilala 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 phase 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 the 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 (TZS)	Time frame
1.	Local employment opportunities		Give employment priority to the local residents	Contractor supervised by Resident Engineer/IMC	646,150 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 v	Contractor supervised by Resident Engineer/IMC	-	During mobilization period
	Potential Impacts		**Mitigation Measures**	**Responsibilities for implementation**	**Cost**	**Time frame**
3.	Landscape disturbance and loss of vegetation cover and habitats	Vegetation clearance	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.	Contractor supervised by Resident Engineer/IMC	597,191,000	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		
			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.		Included in item No. 3 above	
			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	Stockpiling of materials can cause soil pollution by accidental spills.	Proceed to the immediate replacement of the soils removed in the opening trenches.	Contractor supervised by Resident Engineer	Included in item No. 3 above	
			Ensure cleanliness and proper maintenance of ditches and open			

			channels.			
			A layer of topsoil should be stored in order to replace it at the closure of opened trenches.			
6.	Surface water pollution	Stockpiling of materials and earthworks can lead to an increment of Suspended Solids (SS) in the surface waters.	Prevent the accumulation of soil on natural drainage lines, ditches.	Contractor supervised by Resident Engineer	Included in item No. 3 above	

(PROCESL/COWI, 2014)

TABLE 33
EMP IMPLEMENTATION IN THE CONSTRUCTION PHASE

	Potential Impacts		Enhancement Measures	Responsibilities for implementation	Cost (TZS)	Time frame
7.	Local employment opportunities		Local employment opportunities will be enhanced by giving employment priority to the local residents.	Contractor supervised by Resident Engineer	646,150 per day	Before the commencement of the works
	Potential Impacts		**Mitigation Measures**	**Responsibilities for implementation**	**Cost**	**Time frame**
8.	Air pollution	Transport and storage of aggregates and earth materials may produce dust.	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
		Movement of machinery and vehicles will increase dust particles in suspension, which may indirectly affect surrounding crops.	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.		2,350,662	During transportation of materials
			Wet work areas at a rate that does not cause erosion or runoff.			During

			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.			construction period
		Emergence of odours can also occur in this phase, caused by the handling of contaminated storm water.	Bad odour can be eliminated by cleaning the trenches and ensuring no existence of stagnant water.	Contractor supervised by Resident Engineer	Included in item No. 8 above.	During construction period
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)	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 should be avoided and controlled, though site planning of construction activities and the preparation of a site procedures protocol.	Contractor supervised by Resident Engineer	Included in item 3 above	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 the adjacent water courses and/or water bodies.	Contractor supervised by Resident Engineer	---	During construction period

		in the surface waters.	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	4,000,000 capacity development	During construction period
			Prevent the accumulation of soil on natural drainage lines, ditches.	Contractor supervised by Resident Engineer		
11.	Visual and Aesthetic intrusion	Visual and aesthetic intrusion by the movement of machinery, equipment and staff assigned to the construction works.	Minimization of soil and landscape disturbance by planting vegetation after the construction works.	Contractor supervised by Resident Engineer	---	After construction works
			Ensure clearing and proper maintenance of ditches and open channels.			During construction period
			Proceed to the immediate replacement of the soils removed in opening trenches.	Contractor supervised by Resident Engineer	---	After soils removal activity
12.	Soil contamination	Risk of contamination of soils by occasional spills and soil erosion.	Limit soil works within construction areas unless it is absolutely necessary.	Contractor supervised by Resident Engineer	---	During construction period
			The stacking of topsoil should be kept in areas previously disturbed or plowed, clearly marked and accessible by vehicles. This soil must not be contaminated by fuels, oils or other materials or construction waste.			

			Plant vegetation with properties to prevent soil erosion, like creepers and herbaceous, should be kept or replanted whenever possible.	Contractor supervised by Resident Engineer	Include in item No. 3 & 4	After construction works
			The stacks must be appropriately protected against soil erosion from wind, water currents and rainfall.			During construction period
13.	Disruption of natural drainage network	Activities in the streams and channels	Natural flow regimes must be maintained meaning, whenever necessary, alternative and temporary drainage must be implemented.	Contractor supervised by Resident Engineer	---	During construction period
			The sedimentation of streams for construction materials should be minimized.	Contractor supervised by Resident Engineer	---	
14.	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	Included in item No. 13 above.	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.			
			All temporary discharge points shall be located, designed and constructed in a manner that will minimise soil erosion in the receiving channels.			
			Construction materials will only be procured from licensed extraction sites.			
			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.			
15.	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	39,800,000 Environmental protection and	During construction period

			Solid wastes must be categorized according to their physical characteristics e.g. paper, plastic, and metals.	Contractor supervised by Resident Engineer	waste disposal	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.	Contractor supervised by Resident Engineer		
			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.			
16.	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 No. 2 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.	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
		Exclusion effect on				

		fauna particularly mammals, and enhances the occurrence of direct mortalities.				
		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
17.	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/IMC	2,182,668,907.26	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.			
18.	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	43,800,000	Before commencement of works
19.	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	22,831,200 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
20.	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.	PMO-RALG/Contractor/DLAs	Included in item No. 10 above.	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 pond flooding.			
21.	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	5,000,000 from provisional sum.	Before commencement of works and during construction phase
			Provide First Aid kit at each work camp and other working facilities.			Before commencement of works
			Formulate and implement appropriate emergency procedures (such as spill and fire response).			Before commencement of works and during construction phase whenever needed
			Provide appropriate Personnel Protective Equipment (PPE).			
			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.		Included in item No.10 above.	Before commencement of works
22.	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.	Perform a preliminary survey on the location of existing infrastructures that may be damaged by construction activities of the storm water drainage system.	Contractor supervised by Resident Engineer in collaboration with public services utility authorities	267,140,409	During construction phase
			The interruption of services (water, telephone, electricity etc.) should be minimized, through a careful planning, close supervision and a continuous community information program.			Before commencement of works
			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.			During construction phase
			Make arrangements for traffic diversions in the terms of a Traffic Management Plan.			Before commencement of works
23.	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 No. 22 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	Time frame
24.	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.	IMC	Included in item No. 10 above.	At the beginning of the operation phase
			Promote introduction of improved pit latrines in unplanned settlements and introduce construction of sewerage systems.	IMC		At the beginning of the operation phase
			Promote education and awareness campaigns on solid waste management.	IMC		Periodically
25.	Improvement of landscape visual quality		Promote introduction of improved pit latrines in unplanned settlements and introduce construction of sewerage systems.	IMC	Part of Municipal budget.	At the beginning of the operation phase
			Promote education and awareness campaigns on solid waste management.	IMC	Included in Item No. 10 above.	Periodically
	Potential Impacts		**Mitigation Measures**	**Responsibilities for implementation**	**Cost**	**Time frame**
26.	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.	IMC/Contractor	Included in items 10 and 13 above.	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 pond.			Commissioning period
			Attachment of warnings, barriers, and other precautions on all areas of potential risk.			
27.	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.		Included in items 10 and 13 above.	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			Annually

			embankment in the detention pond.			
			Cleaning out clogged outlet and drainage system in the detention pond.			Annually
28.	Soil contamination and landscape disturbance	Risk of soil contamination by contaminated water infiltration by illegal discharges.	Assure clearing of all components of the storm water drainage system. Assure regular inspection of the storm water drainage system.		Included in item No. 13 above.	Annually
29.	Emergence of 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 channels occur.				
30.	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.	IMC/Contractor	Included in item No. 10 above.	Annually
		\Production of organic materials and sediments by surface water drainage channels clearing and Cleaning out clogged outlet and drainage system at the detention pond.				
		Illegal discharge of solid and liquid wastes to the channels	Ilala 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.			
31.	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 / Contractor	Included in item No. 10 above.	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.			Annually
32.	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 of warning signs, barriers, and other precautions on all areas of potential risk.	IMC / Contractor	Part of Municipal budget.	At the beginning of the operation phase and whenever necessary (when damaged)
			Implement community sensitization programs on safety measures to be taken.			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 Ilala 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 outlines some major elements of the monitoring plan for the Ilala Surface Water Drainage System project.

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).

TABLE 35
MOBILIZATION MONITORING PLAN

Impact	Mitigation measure	Indicator	Location/Sampling area	Procedure/Measuring Unit	Verification	Duration/ Frequency	Objective/ Standard	Responsibility	Cost estimate (USD)
Landscape disturbance and loss of vegetation cover and habitats	• Proceed to the immediate replacement of the soils removed in the opening trenches.	Replacement of soils	Opened tranches	Visual observations, through supervision	Reporting	Punctual unannounced inspections during working hours	Minimization of landscape disturbance	Environmental Consultant in collaboration with Resident Engineer	*1,500
	• Ensure cleanliness and proper maintenance of ditches and channels.	Presence of waste	Ditches and channels	Visual observations, through supervision	Reporting	Punctual unannounced inspections during working hours	Avoid waste disposal	Environmental Consultant in collaboration with Resident Engineer	
	• A layer of topsoil should be stored in order to replace it at the closure of opened trenches.	Top-soil storage	Storage sites	Visual observations, through supervision	Reporting	Punctual unannounced inspections during working hours	Reuse of top-soil to minimize loss of vegetation cover	Environmental Consultant in collaboration with Resident Engineer	
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	Air quality (dust production)	Construction site and/or surroundings	Visual observations	Reporting forms and keeping records	During earthworks	Assure compliance with legal requirements.	Environmental Consultant in collaboration with Resident	*1,500

	areas to avoid the accumulation of dust either by wind or by the movement of vehicles and equipment.	Complaints			(complaints)		Response to complaints.	Engineer	

(PROCESL/COWI, 2014)

TABLE 36
CONSTRUCTION MONITORING PLAN

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
	• Fuelling of machinery and vehicles as well as	Oil spills marks	Equipment maintenance	Visual observations	Reporting	Periodic	Preservation of soil	Environmental Consultant in	

	equipment maintenance should be done in concrete floors previously identified within the site.		facilities and fuelling				Prevention of water pollution	collaboration with Resident Engineer	
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 must be covered during transportation; • Regular cleaning of access roads and unpaved areas.	Air quality (dust production) Complaints	Construction site and/or surroundings	Visual observations Reporting forms and keeping records (complaints)	Reporting forms and keeping records (complaints)	During earthworks and works in dry season	Assure compliance with legal requirements. Response to complaints.	Environmental Consultant in collaboration with Resident Engineer	*1,000
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	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	---

	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.								
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; • Construction sites and temporary warehouses should be cleaned to prevent indiscriminate fires, burial or abandonment of waste.	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
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);	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

	• 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.								
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; • 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.	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	195,524

(PROCESL/COWI, 2014)

TABLE 37

OPERATION MONITORING PLAN

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/IMC	*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/IMC	*800
Disruption of natural drainage network	• Clearing of all components of the storm water drainage system including cleaning out clogged outlet and drainage system.	Cleaning Evidence	Detention pond	Inspection	Reporting	After each heavy storm events	Evaluation of the operation	DMDP/PMO-RALG/IMC	*2,500
	• Removal and properly disposal of the accumulated sediments in the detention pond.	Sediments presence	Detention pond	Removal and properly disposal of the accumulated sediments	Reporting	After a heavy storm event or every two years	Ensure the efficient operation of detention pond	DMDP/PMO-RALG/IMC	
	• Removal of eventual unwanted vegetation especially on embankment (when applicable) in the detention pond.	Vegetation presence	Detention pond	Removal of eventual unwanted vegetation especially on embankment	Reporting	Periodic	Ensure the efficient operation of detention pond	DMDP/PMO-RALG/IMC	

Impact	Mitigation measure	Indicator	Location	Procedure	Verification	Duration	Objective	Responsibility	Cost estimate (USD)
Transmission of diseases	• 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.	Water stagnation	Storm water drainage system	Water sampling Laboratory testing	Reporting	At the beginning of the operation phase	Prevention of water stagnation	DMDP/PMO-RALG/IMC	*1,500
	• Assure clearing of all components of the storm water drainage system.			Inspection	Reporting	Annually			
	• Assure regular inspection of the storm water drainage system.				Reporting	Annually			
Risk of drowning for the population during heavy rains	• Attachment of warnings and barriers on the detention pond.	Accidents report Complaints	Detention pond	Inspection	Reporting	At the beginning of the operation phase and whenever necessary (when damaged)	Prevention of accidents	DMDP/PMO-RALG/IMC	*500
	• Implement community sensitization programs on safety measures to be taken.					At the beginning of the operation phase			Included in capacity building activity above.

(PROCESL/COWI, 2014)

* = Consultants' estimates

CHAPTER 10: COST BENEFIT ANLYSES

10.1 DEFINING NVP AND IRR

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

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

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

Risk analysis

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

- Hazard corresponds to the intensity and frequency of flooding (and it is presented through the estimated flooded area for each rainfall event and the corresponding 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 frequency) 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-projects arise due to the savings in terms of avoided costs and correspond to the risk reduction introduced by the Sub-projects.

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 did not 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-projects, allows for expected damages per period of return and the annual expected extent of damages to be calculated.

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-projects is based on the calculation of the net present value (NPV), benefit/costs ratio (B/C), and internal rate of return (IRR).

The discounted expected benefits lead to the net present value of the Sub-projects. 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 interventions in Ilala Municipality. The estimated costs are presented excluding the costs of demolition of houses and the resettlement of people as a sub total of the base construction cost with the supervision construction and contingency in the 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	Quantity	Rate	Cost (1,000 USD)
Kiwalani				
General Preparatory works	-			24.00
Construction of rectangular open channel D1.00m; B1.50m	m	227	360	81.72
Construction of rectangular open channel D1.00m; B1.75m	m	163	390	63.57
Construction of rectangular open channel D1.00m; B2.00m	m	140	420	58.80
Lay and supply of underground concrete rectangular frame D1.00 m; B2.25 m	m	183	1150	210.45
Construction of pedestrian crossings	unit	4	2000	8.00
Construction of vehicular crossings	unit	3	9000	27.00
Construction of final outlet	unit	1	1500	1.50
Others	-			12.00
SUB TOTAL BASE COST				**487.04**
Supervision Cost (5%)				24.35
Physical Contingencies (7.5%)				38.35
Price Contingencies (7.5%)				41.23
GRAND TOTAL COST				**590.98**
Kigilagila				
General and Preparatory works	-			120.00
Construction of rectangular open channel D1.30m; B1.50m	m	120	425	51.00
Construction of rectangular open channel D1.30m; B4.00m	m	449	725	325.53
Lay and supply of underground concrete rectangular frame D1.05 m; B4.00 m	m	211	1550	327.05
Construction of rectangular open channel D1.50m; B4.00m	m	550	775	426.25
Construction of rectangular open channel D1.75m; B4.00m	m	154	840	129.36
Construction of rectangular open channel D1.50m; B5.00m	m	903	900	812.70
Enlargement of bridge section	unit	3	30000	90.00
Construction of marginal concrete walls	m	110	700	77.00
Construction of pedestrian crossings	unit	2	2000	4.00
Construction of vehicular crossings	unit	8	18000	144.00
Construction of final outlet	unit	1	1500	1.50
Others	-			60.00
SUB TOTAL BASE COST				**2,568.39**
Supervision Cost (5%)				128.42
Physical Contingencies (7.5%)				202.26
Price Contingencies (7.5%)				217.43
GRAND TOTAL COST				**3,116.49**

Item	Unit	Quantity	Rate	Cost (1,000 USD)
Minazi Mirefu				
General and Preparatory works	-			25.00
Construction of rectangular open channel D0.75m; B1.50m	m	80	310	24.80
Construction of rectangular open channel D1.25m; B1.50m	m	173	450	77.85
Lay and supply of underground concrete rectangular frame D1.00 m; B1.00 m	m	107	800	85.60
Lay and supply of underground concrete rectangular frame D1.00 m; B1.50 m	m	212	950	201.40
Construction of rectangular open channel D1.00m; B1.50m	m	114	360	41.04
Construction of manholes	unit	6	1500	9.00
Construction of vehicular crossings	unit	4	9000	36.00
Construction of final outlet	unit	1	1500	1.50
Others	-			12.00
SUB TOTAL BASE COST				**514.19**
Supervision Cost (5%)				25.71
Physical Contingencies (7.5%)				40.49
Price Contingencies (7.5%)				43.53
GRAND TOTAL COST				**623.92**
Buguruni				
General and Preparatory works	-			100.00
Construction of rectangular open channel D0.65m; B4.25m	m	199	600	119.40
Construction of rectangular open channel D0.75m; B5.00m	m	250	700	175.00
Construction of rectangular open channel D1.00m; B5.00m	m	113	750	84.75
Construction of rectangular open channel D1.20m; B5.00m	m	150	825	123.75
Construction of rectangular open channel D1.40m; B5.00m	m	353	875	308.88
Construction of rectangular open channel D2.00m; B8.00m	m	259	1450	375.55
Construction of pedestrian crossings	unit	10	2500	25.00
Construction of vehicles crossings	unit	4	30000	120.00
Lateral drainage	m	600	400	240.00
Construction of final outlet	unit	1	1500	1.50
Others	-	-	-	50.00
SUB TOTAL BASE COST				**1,723.83**
Supervision Cost (5%)				86.19
Physical Contingencies (7.5%)				135.75
Price Contingencies (7.5%)				145.93

Item	Unit	Quantity	Rate	Cost (1,000 USD)
GRAND TOTAL COST				**2,091.70**
Tenge and Luwiti				
General and Preparatory works	-			50.00
Lay and supply of concrete pipe 1,000 mm dia.	m	271	790	214.09
Lay and supply of concrete pipe 1,200 mm dia.	m	71	940	66.74
Lay and supply of underground concrete rectangular frame D1.5 m; B1.5 m	m	368	1100	404.80
Construction of rectangular open channel D1.50m; B1.50m	m	246	500	123.00
Construction of manholes	unit	13	500	19.50
Construction of pedestrian crossings	unit	5	2000	10.00
Construction of vehicles crossings	unit	3	12000	36.00
Road drainage	m	85	300	25.50
Others	-	-	-	25.00
SUB TOTAL BASE COST				**974.63**
Supervision Cost (5%)				48,73
Physical Contingencies (7.5%)				76,75
Price Contingencies (7.5%)				82,51
GRAND TOTAL COST				**1,182.62**
Tembo Mgwaza				
General and Preparatory works	-			70.00
Lay and supply of concrete pipe 300 mm dia.	m	143	400	57.20
Lay and supply of concrete pipe 400 mm dia.	m	160	467	74.72
Lay and supply of concrete pipe 600 mm dia.	m	141	580	81.78
Lay and supply of concrete pipe 800 mm dia.	m	470	679	319.13
Lay and supply of concrete pipe 1,000 mm dia.	m	112	790	88.48
Lay and supply of underground concrete rectangular frame D1.0 m; B1.25 m	m	61	875	53.38
Lay and supply of underground concrete rectangular frame D1.0 m; B1.5 m	m	146	950	138.70
Lay and supply of underground concrete rectangular frame D1.0 m; B2.0 m	m	90	1100	99.00
Lay and supply of underground concrete rectangular frame D1.0 m; B2.5 m	m	223	1 250	278.75
Construction of manholes	unit	27	1500	40.50
Construction of special manholes to collect the flow from the existing channel	unit	1	3000	3.00
Road drainage	m	290	300	87.00
Construction of final outlet	unit	1	1000	1.00
Others	-			35.00
SUB TOTAL BASE COST				**1,427.64**

Item	Unit	Quantity	Rate	Cost (1,000 USD)
Supervision Cost (5%)				71.83
Physical Contingencies (7.5%)				112.43
Price Contingencies (7.5%)				120.86
GRAND TOTAL COST				**1,732.30**
Bonde la Sungura				
General and Preparatory works	-			36.00
Lay and supply of concrete pipe 500 mm dia.	m	99	530	52.47
Lay and supply of concrete pipe 600 mm dia.	m	137	580	79.46
Lay and supply of concrete pipe 800 mm dia.	m	72	679	48.89
Lay and supply of concrete pipe 1,000 mm dia.	m	370	790	292.30
Construction of open channel with D between 0.3 and 0.8 m B0.5m	m	261	250	65.25
Enlargement and lining with concrete of a trapezoidal section D1.0m B2.5m	m	136	550	74.80
Construction of manholes	unit	19	1500	28.50
Road drainage	m	160	300	48.00
Construction of final outlet	unit	1	1000	1.00
Others	-			18.00
SUB TOTAL BASE COST				**744.67**
Supervision Cost (5%)				37.23
Physical Contingencies (7.5%)				58.64
Price Contingencies (7.5%)				63.04
GRAND TOTAL COST				**903.58**
Mafuriko				
General and Preparatory works	-			60.00
Lay and supply of underground concrete rectangular frame D0.9m B1.5m	m	341	900	306.90
Lay and supply of underground concrete rectangular frame D1.0m B2.0m	m	368	1100	404.80
Lay and supply of underground concrete rectangular frame D0.6m B1.5m	m	293	800	234.40
Lay and supply of underground concrete rectangular frame D0.85m B1.5m	m	229	850	194.65
Construction of manholes	unit	19	1500	28.50
Road drainage	m	72	300	21.60
Gullies	unit	7	300	2.10
Intersection with existing culvert	unit	1	2000	2.00
Others	-			30.00
SUB TOTAL BASE COST				**1,284.95**
Supervision Cost (5%)				64.25

Item	Unit	Quantity	Rate	Cost (1,000 USD)
Physical Contingencies (7.5%)				101.19
Price Contingencies (7.5%)				108.78
GRAND TOTAL COST				**1,559.17**

(PROCESL/COWI, 2014)

NVP AND IRR

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

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

TABLE 39

CALCULATION OF NET PRESENT VALUE OF THE PROJECT

Year	Costs	Benefits	Net benefits	Discounted costs	Discounted benefits	Discounted net Benefits
KILWALANI						
1	236	0	-236	211	0	-211
2	236	0	-236	188	0	-188
3	5	194	189	3	138	135
4	5	196	191	3	124	121
5	5	198	193	3	112	110
6	5	200	195	2	101	99
7	5	202	197	2	91	89
8	5	204	199	2	82	80
9	5	206	201	2	74	72
10	5	208	203	2	67	65
11	5	210	205	1	60	59
12	5	212	207	1	54	53
13	5	214	209	1	49	48
14	5	216	212	1	44	43
15	5	218	214	1	40	39
16	5	221	216	1	36	35
17	5	223	218	1	32	32

Year	Costs	Benefits	Net benefits	Discounted costs	Discounted benefits	Discounted net Benefits
18	5	225	220	1	29	29
19	5	227	223	1	26	26
20	5	230	225	0	24	23
21	5	232	227	0	21	21
22	5	234	229	0	19	19
23	5	236	232	0	17	17
24	5	239	234	0	16	15
25	5	241	237	0	14	14
26	5	244	239	0	13	13
27	5	246	241	0	12	11
NPV						**870**
KIGILAGILA						
1	1,229	0	-1,229	1,097	0	-1,097
2	1,229	0	-1,229	979	0	-979
3	5	650	645	3	462	459
4	5	656	651	3	417	414
5	5	663	658	3	376	373
6	5	669	664	2	339	337
7	5	676	671	2	306	304
8	5	683	678	2	276	274
9	5	689	685	2	249	247
10	5	696	692	2	224	223
11	5	703	699	1	202	201
12	5	710	706	1	182	181
13	5	717	713	1	164	163
14	5	725	720	1	148	147
15	5	732	727	1	134	133
16	5	739	735	1	121	120
17	5	747	742	1	109	108
18	5	754	749	1	98	97
19	5	762	757	1	88	88
20	5	769	765	0	80	79
21	5	777	772	0	72	71
22	5	785	780	0	65	64
23	5	793	788	0	58	58
24	5	800	796	0	53	52
25	5	808	804	0	48	47

Year	Costs	Benefits	Net benefits	Discounted costs	Discounted benefits	Discounted net Benefits
26	5	817	812	0	43	43
27	5	825	820	0	39	38
NPV						**2.246**
Buguruni						
1	908	0	-908	810	0	-810
2	908	0	-908	723	0	-723
3	18	793	775	13	565	552
4	18	801	783	12	509	498
5	18	809	791	10	459	449
6	18	817	799	9	414	405
7	18	825	807	8	373	365
8	18	834	816	7	337	329
9	18	842	824	7	304	297
10	18	851	832	6	274	268
11	18	859	841	5	247	242
12	18	868	849	5	223	218
13	18	876	858	4	201	197
14	18	885	867	4	181	177
15	18	894	876	3	163	160
16	18	903	885	3	147	144
17	18	912	894	3	133	130
18	18	921	903	2	120	117
19	18	930	912	2	108	106
20	18	939	921	2	97	96
21	18	949	931	2	88	86
22	18	958	940	1	79	78
23	18	968	950	1	71	70
24	18	978	959	1	64	63
25	18	987	969	1	58	57
26	18	997	979	1	52	51
27	18	1.007	989	1	47	46
NPV						**3.668**
Minazi Mirefu						
1	245	0	-245	219	0	-219
2	245	0	-245	195	0	-195
3	5	152	147	3	108	104
4	5	153	148	3	97	94
5	5	155	150	3	88	85

Year	Costs	Benefits	Net benefits	Discounted costs	Discounted benefits	Discounted net Benefits
6	5	156	151	2	79	77
7	5	158	153	2	71	69
8	5	159	155	2	64	62
9	5	161	156	2	58	56
10	5	162	158	2	52	51
11	5	164	159	1	47	46
12	5	166	161	1	43	41
13	5	167	163	1	38	37
14	5	169	164	1	35	34
15	5	171	166	1	31	30
16	5	172	168	1	28	27
17	5	174	169	1	25	25
18	5	176	171	1	23	22
19	5	178	173	1	21	20
20	5	179	175	0	19	18
21	5	181	177	0	17	16
22	5	183	178	0	15	15
23	5	185	180	0	14	13
24	5	187	182	0	12	12
25	5	189	184	0	11	11
26	5	190	186	0	10	10
27	5	192	188	0	9	9
NPV						**572**
Tenge and Luwiti						
1	630	0	-630	563	0	-563
2	630	0	-630	502	0	-502
3	18	531	513	13	378	365
4	18	536	518	12	341	329
5	18	542	524	10	307	297
6	18	547	529	9	277	268
7	18	553	534	8	250	242
8	18	558	540	7	225	218
9	18	564	546	7	203	197
10	18	569	551	6	183	177
11	18	575	557	5	165	160
12	18	581	563	5	149	144
13	18	587	568	4	134	130
14	18	592	574	4	121	118

Year	Costs	Benefits	Net benefits	Discounted costs	Discounted benefits	Discounted net Benefits
15	18	598	580	3	109	106
16	18	604	586	3	99	96
17	18	610	592	3	89	86
18	18	617	598	2	80	78
19	18	623	605	2	72	70
20	18	629	611	2	65	63
21	18	635	617	2	59	57
22	18	642	623	1	53	52
23	18	648	630	1	48	46
24	18	654	636	1	43	42
25	18	661	643	1	39	38
26	18	668	649	1	35	34
27	18	674	656	1	32	31
NPV						**2.380**
Tembo Mgwaza						
1	700	0	-700	625	0	-625
2	700	0	-700	558	0	-558
3	18	148	130	13	105	92
4	18	150	131	12	95	84
5	18	151	133	10	86	75
6	18	153	134	9	77	68
7	18	154	136	8	70	61
8	18	156	137	7	63	56
9	18	157	139	7	57	50
10	18	159	141	6	51	45
11	18	160	142	5	46	41
12	18	162	144	5	42	37
13	18	164	145	4	37	33
14	18	165	147	4	34	30
15	18	167	149	3	30	27
16	18	169	150	3	27	25
17	18	170	152	3	25	22
18	18	172	154	2	22	20
19	18	174	155	2	20	18
20	18	175	157	2	18	16
21	18	177	159	2	16	15
22	18	179	161	1	15	13
23	18	181	163	1	13	12
24	18	182	164	1	12	11

Year	Costs	Benefits	Net benefits	Discounted costs	Discounted benefits	Discounted net Benefits
25	18	184	166	1	11	10
26	18	186	168	1	10	9
27	18	188	170	1	9	8
NPV						**-304**
Bonde la Sungura						
1	363	0	-363	324	0	-324
2	363	0	-363	289	0	-289
3	18	194	176	13	138	125
4	18	196	178	12	124	113
5	18	198	180	10	112	102
6	18	200	182	9	101	92
7	18	202	184	8	91	83
8	18	204	186	7	82	75
9	18	206	188	7	74	68
10	18	208	190	6	67	61
11	18	210	192	5	60	55
12	18	212	194	5	54	50
13	18	214	196	4	49	45
14	18	216	198	4	44	41
15	18	218	200	3	40	37
16	18	221	202	3	36	33
17	18	223	205	3	32	30
18	18	225	207	2	29	27
19	18	227	209	2	26	24
20	18	230	211	2	24	22
21	18	232	214	2	21	20
22	18	234	216	1	19	18
23	18	237	218	1	17	16
24	18	239	221	1	16	15
25	18	241	223	1	14	13
26	18	244	226	1	13	12
27	18	246	228	1	12	11
NPV						**573**
Mafuriko						
1	354	0	-354	316	0	-316
2	354	0	-354	282	0	-282
3	18	485	467	13	346	333
4	18	490	472	12	312	300
5	18	495	477	10	281	271

Year	Costs	Benefits	Net benefits	Discounted costs	Discounted benefits	Discounted net Benefits
6	18	500	482	9	253	244
7	18	505	487	8	229	220
8	18	510	492	7	206	199
9	18	515	497	7	186	179
10	18	521	502	6	168	162
11	18	526	508	5	151	146
12	18	531	513	5	136	132
13	18	536	518	4	123	119
14	18	542	524	4	111	107
15	18	547	529	3	100	97
16	18	553	534	3	90	87
17	18	558	540	3	81	79
18	18	564	545	2	73	71
19	18	569	551	2	66	64
20	18	575	557	2	60	58
21	18	581	563	2	54	52
22	18	587	568	1	48	47
23	18	592	574	1	44	42
24	18	598	580	1	39	38
25	18	604	586	1	36	34
26	18	610	592	1	32	31
27	18	616	598	1	29	28
NPV						**2.541**

(PROCESL/COWI, 2014)

Next table resumes the net present value (NPV), benefit/costs ratio (B/C) and the internal rate of return (IRR) of each sub-project.

TABLE 40

NET PRESENT VALUE, BENEFIT/COSTS RATIO AND INTEREST RATE OF RETURN OF EACH SUB-PROJECT

Sub-project	Total Discounted costs	Total Discounted benefits	Total Discounted net Benefits	IRR	B/C ratio
Kiwalani	428	1,299	870	35.1%	3.0
Kigilagila	2,106	4,352	2,246	24.3%	2.1
Buguruni	1,647	5,315	3,668	37.0%	3.2
Minazi Mirefu	444	1,015	572	27.3%	2.3
Tenge and Luwiti	1,178	3,558	2,380	35.6%	3.0
Tembo Mgwaza	1,297	992	-304	8.5%	0.8

Bonde la Sungura	726	1,299	573	22.7%	1.8
Mafuriko	712	3,253	2,541	53.2%	4.6

(PROCESL/COWI, 2014)

10.2 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%. 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%;
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.

For all sub-projects, 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).

For IL3 - Minazi / Mirefu and IL7 - Mtambani / Food Security Sub-projects a range of positive NPV amounts was computed for the different scenarios, thus even for the worst scenario there would still be a positive social return on those sub-projects.

For IL5, IL8, IL10B and IL11 Sub-projects a range of positive NPV amounts was computed for the different scenarios, thus even for the worst scenario there would still be a positive social return on those sub-projects.

IL10A Sub-project presents a negative social return in every tested scenario.

TABLE 41

SENSITIVITY ANALYSIS

	Baseline Scenario	**Costs ↗ 30%**	**Land Benefits ↘ 30%**	**Property Exposure ↘25%**	**Extreme Scenario**
	(0)	**(1)**	**(2)**	**(3)**	**(1)+(2)+(3)**
Kiwalani					
NPV (millions USD)	870	741.7	812.0	597.7	410.9
B/C (No.)	3.0	2.3	2.9	2.4	1.7
IRR (%)	35.1%	27.8%	33.7%	28.5%	21.2%

	Baseline Scenario	Costs ↗ 30%	Land Benefits ↘ 30%	Property Exposure ↘25%	Extreme Scenario
	(0)	(1)	(2)	(3)	(1)+(2)+(3)
Kigilagila					
NPV (millions USD)	2,246	1,614.7	2,057.0	1,329.1	508.0
B/C (No.)	2.1	1.6	2.0	1.6	1.2
IRR (%)	24.3%	19.1%	23.3%	19.6%	14.4%
Buguruni					
NPV (millions USD)	3,668	3,174.0	3,277.0	2,677.3	1,791.9
B/C (No.)	3.2	2.5	3.0	2.6	1.8
IRR (%)	37.0%	29.4%	34.7%	30.9%	22.3%
Minazi Mirefu					
NPV (millions USD)	572	438.5	517.3	365.6	178.3
B/C (No.)	2.3	1.8	2.2	1.8	1.3
IRR (%)	27.3%	21.4%	26.0%	22.2%	16.0%
Tenge and Luwiti					
NPV (millions USD)	2,380	2,026.8	2,223.6	1,630.5	1,120.4
B/C (No.)	3.0	2.3	2.9	2.4	1.7
IRR (%)	35.6%	28.1%	34.2%	28.8%	21.4%
Tembo Mgwaza					
NPV (millions USD)	-304	-693.3	-345.1	-515.8	-945.4
B/C (No.)	0.8	0.6	0.7	0.6	0.4
IRR (%)	8.5%	5.5%	8.0%	5.7%	2.5%
Bonde la Sungura					
NPV (millions USD)	573	355.1	538.1	281.3	28.7
B/C (No.)	1.8	1.4	1.7	1.4	1.0
IRR (%)	22.7%	17.4%	22.1%	17.5%	12.5%
Mafuriko					
NPV (millions USD)	2,541	2,327.8	2,336.3	1,907.2	1,488.6
B/C (No.)	4.6	3.5	4.3	3.7	2.6
IRR (%)	53.2%	42.4%	50.3%	44.2%	32.5%

(PROCESL/COWI, 2014)

CHAPTER 11.0: DECOMISSIONING

The Sub-project, which addresses the rehabilitation of storm water drainage systems in Ilala Municipality in conjunction with the construction of a detention pond, 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 not degrade or pollute the environment.

However, in the unlikely event that decommissioning is necessary, drainage structures will need dismantling, and the shipment and final disposal of materials as well as site cleaning and rehabilitation will be necessary. The site shall be left in a safe and environmentally acceptable condition.

Under these circumstances, it will be necessary to hire workers for the removal of structures. Decommissioning activities will also result in the generation of wastes from obsolete materials and unwanted materials. Mechanisms for identification, collection and disposal shall be in place to ensure all wastes have been collected, removed and correctly 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 sees that the findings of these studies are included in the audit reports that would feed into a decommissioning plan, when necessary**.**

CHAPTER 12.0: SUMMARY AND CONCLUSION

The actual surface water system in Ilala Municipality is already creating environmental health hazards for the local residents, especially the vulnerable poor members 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-projects in Ilala Municipality aim at improving the current drainage system in the municipality, thus improving the welfare of the population.

Although these Sub-projects might have some potential negative impacts as mentioned in the present EIA Report, such as land acquisition and/or involuntary resettlement, it is safe to say that it will have more significant positive impacts, that are crucial for the municipality.

This project will create temporary employment, provide opportunities to local businesses, 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, the project implementation will also contribute to the reduction of soil erosion, as well as the visual and aesthetic appearance of the urban landscape of Ilala 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 by the various environmental components analysed, it is believed that if the mitigation measures recommended in this Report are implemented, there will be no environmental constraints on the implementation of the project 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 project it is recommended to implement the management actions described in the Environmental Management Plan (EMP) as well as the mitigation measures proposed in the EIA Report.

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CHAPTER 14.0: APPENDIX

14.1 TERMS OF REFERENCE

14.1.1 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 the proposed Surface Water Drainage in Ilala Municipality.

14.1.2 Objectives

The main objective of undertaking Environmental Impact Assessment for the improvement of Surface Water Drainage in Ilala Municipality 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.

14.1.3 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.

14.1.4 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.

14.1.5 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.

14.1.6 Consultant Qualifications and Experience

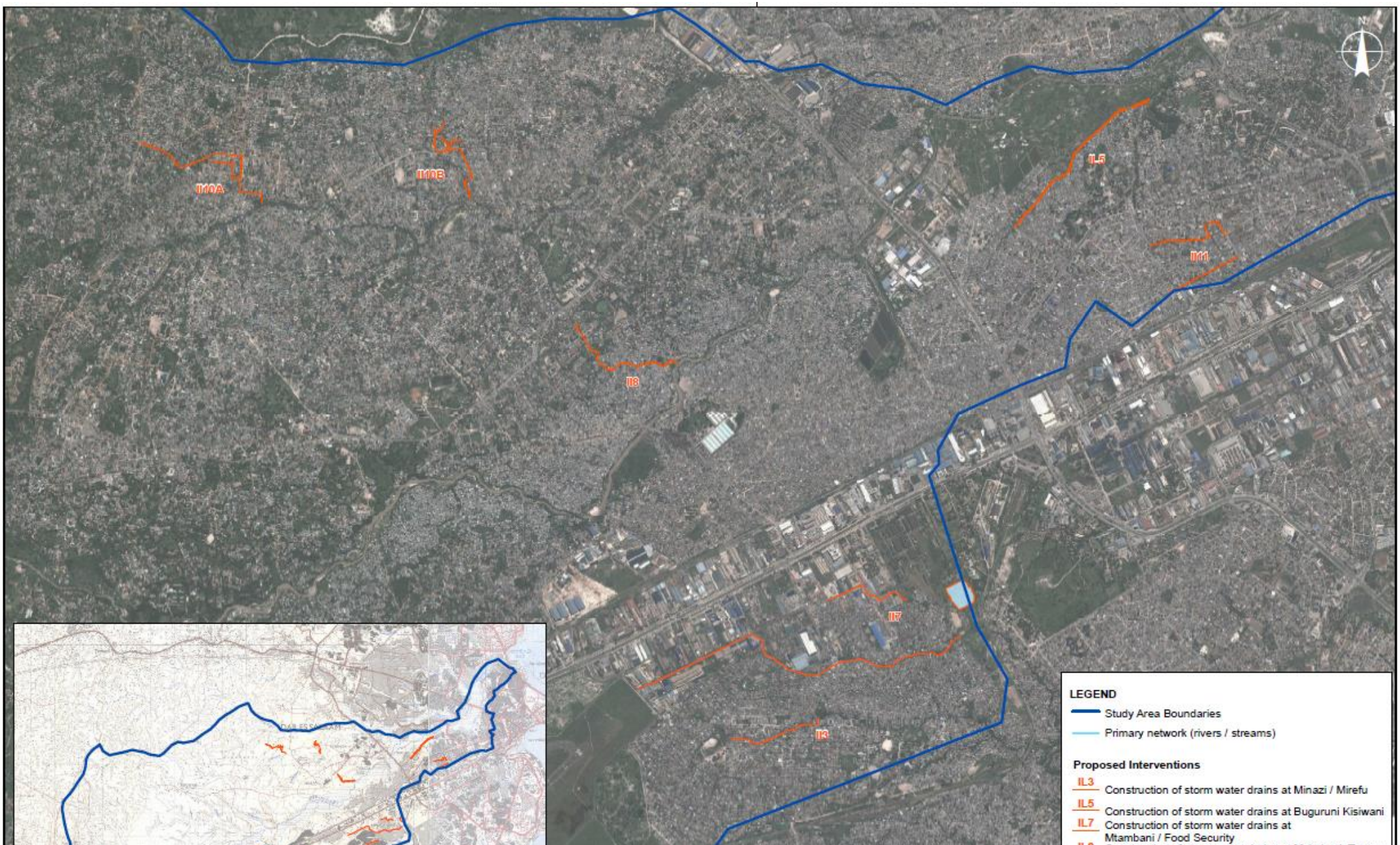
The individual consultant for conducting the assignment should have the following qualifications: (1) At least MSc. in Environmental Management, Environmental Planning or related field; (2) Sound knowledge of social aspects; (3) a proven ability for undertaking environmental and social assessments; (4) 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 SUMMARY OF STAKEHOLDERS VIEWS AND CONCERNS

14.3 SIGNATURES OF STAKEHOLDERS COLSULTED

14.4 PROJECT LAYOUT


IL10A
IL10B
IL8
IL5
IL11
IL7
IL3
LEGEND
Study Area Boundaries
Primary network (rivers / streams)
Proposed Interventions
IL3 Construction of storm water drains at Minazi / Mirefu
IL5 Construction of storm water drains at Buguruni Kisiwani
IL7 Construction of storm water drains at Mtambani / Food Security

14.5 ADOPTED SOLUTIONS

14.6LOCATION AND DEFINITION OF PROPOSED INTERVENTIONS – TEMEKE COUNCIL

14.7 RESETTLMENT SUMMARY

Intervention	Ahs	Ward	Acquired building/structure	Acquired Land	Crops value	Allowances				Total Cost
						Accommodation	Transport	Loss of profit	Disturbance	TZS
IL3, IL7, IL5, IL8 IL10A, IL10B, & IL11	29	Kiwalani (Kigilagila)	59,127,090	24,054,000	3,554,362	6,120,000.00	-	-	6,660,969.74	99,516,421.66
	28	Kiwalani (Minazi Mirefu)	66,394,903.00	48,023,700.00	21,633,136.14	14,580,000.00	1,200,000.00	-	10,884,139.13	162,715,878.27
	73	Kiwalani (Yombo)	180,366,428	58,562,370	10,485,248	37,620,000.00		-	17,819,901.51	304,853,947.13
	1	Ilala	2,940,000	-	-	-	-	-	235,200.00	3,175,200.00
	84	Buguruni	51,387,650	51,985,030	12,123,482	7,020,000	-	13,687,920	9,214,193	145,418,275
	13	Kimanga	35,500,409	27,519,390	3,202,921	2,880,000	-	-	2,935,888	72,038,608
	5	Kimanga	17,051,760	3,409,800	40,000	1,440,000	-	-	838,796	22,780,356
	42	Tabata	137,344,474	88,654,600	4,388,990	19,440,000	-	-	13,014,860	262,842,923
	275.00	**-**	**550,112,713.80**	**302,208,890.00**	**55,428,138.31**	**89,100,000.00**	**1,200,000.00**	**13,687,920.00**	**61,603,947.57**	**1,073,341,609.68**

End Notes

[i] Improvement of Surface Water Drainage System Sub-projects in Ilala 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 design

[ii] Ilala Municipal Council

[iii] IMPLEMENTATION OF THE NATIONAL ENVIRONMENT POLICY: A CASE OF THE LOCAL GOVERNMENT AUTHORITIES IN DAR ES SALAAM CITYTANZANIA. Thesis Submitted to the Faculty of Social Sciences, University of Bergen, in Partial Fulfilment for the Award of the Degree of Masters of Philosophy in Public Administration ROSEMARY OSWALD MRUMA. Department of Public Administration and Organisation Theory. Spring, 2005

[iv] Dar Es Salaam Marine Ecology Conservation. CONCEPT PAPER. World Care.

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

vi Operational Policy

vii Bank Procedure

[viii] 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 HealthOrganization Regional Office for Europe Copenhagen WHO Regional Publications, European Series, No. 91 Second Edition, 2000

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

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

[xi] Geofrey Kamukana " The City of Dar es Salaam striving to resolve environmental problems"

[xii]MUNICIPAL SOLID WASTE MANAGEMENT IN DAR ES SALAAM. BASELINE ANALYSIS. Prepared for the Dar Es Salaam Metropolitan Development Project (DMDP) and Improving Municipal Solid Waste Management with Local and Global Co-benefits. Prepared by Robert Breeze Toronto, ON, Canada. June 2, 2012.

[xii] Municipal Solid Waste in Dar es salaam

[xiii] *Ditto*

[xiv]Socio-Economic Profile for Ilala Municipal Council (2013)

[xv] Ilala District Profile