UNITED REPUBLIC OF TANZANIA
PRIME MINISTER'S OFFICE REGIONAL ADMINISTRATION AND
LOCAL GOVERNMENT
P. O. Box 1923
Dodoma, Tanzania.

ENVIRONMENTAL IMPACT STATEMENT FOR THE
PROPOSED INVESTMENT SUB-PROJECTS IN ARUSHA
MUNICIPALITY UNDER THE PROPOSED TANZANIA
STRATEGIC CITIES PROJECT

FINAL REPORT

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EXECUTIVE SUMMARY

BACKGROUND

The Permanent Secretary, Prime Minister's Office, Regional Administration and Local Government of the United Republic of Tanzania (GoT) have received a credit from the International Development Association (IDA) for the implementation of the Local Government Support Project (LGSP). It is intended that part of the proceeds of the credit will be used to cover eligible costs under the contract for the Provision of Consultancy Services for Preparation of Preliminary and Detailed Engineering Designs, Cost Estimates and Bidding Documents, and Environmental and Social Impact Assessments for the Investment Sub-Projects in Arusha Municipality under the proposed Tanzania Strategic Cities Project (TSCP). The LGSP, which is in an advanced stage of implementation, became effective in April 2005, and is expected to close on June 30, 2011. In this report the subprojects have been categorised into three clusters, whereby, Cluster I: contains all roads, Cluster II: Storm drain and Cluster II: Construction of landfill.

The Indicative Planning Figure for the sub-projects in Arusha Municipality is T.Sh. 21 billion. The implementation of the subprojects is planned to be done in two phases, phase I and Phase II as will be indicated later in this report.

The investment Subprojects in Arusha Municipality under the proposed Tanzania Strategic Cities will entail rehabilitation/ construction of the following:
- Urban roads, including associated structures such as drainage ditches, culverts/ bridges, footpaths and street lighting;
- Solid waste management including collection, transportation and disposal;
- Community infrastructure upgrading; and,
- Urban storm drains.

POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

Tanzania is committed to attaining sustainable development goal. This urge is envisaged in the National Environmental Policy and other sectoral policies including:
- National Environmental Policy (NEP) of 1997
- National Gender Policy (1999)
• The National Water Policy (2002)
• National Strategy for Growth and Reduction of Poverty
• National Policy on HIV/AIDS (2001)

Important laws and regulations that have relevance to the proposed projects in respect of environmental management include;

• Environmental Impact Assessment and Auditing Regulations (2005)
• The Land Act No. 4 of 1999 and the Village Land Act No. 5 of (1999)
• The Water Utilization (Control and Regulation) Act (1974) as amended in 1981 (Act No.10)
• The Road Act, 2007
• Protected Places and Areas Act (1969)
• Antiquities Act of 1964 (as amended in 1979) and the Antiquities Rules of 1991
• The Urban Planning Act (2007)
• Land Use Planning Act (2007)
• Occupation Health Safety (2003)
• Local Government Acts No.7 & 8 of 1982
• Land (Assessment of the Value of Land for Compensation) Regulations, 2001
• Explosives Act, 538
• Regional Administration and Local Government Act No 9, 1997
• Environmental Assessment and Management Guidelines for the Road Sector
• Mining Act (1998)
• The Land Acquisition Act 1967

PROJECT DESCRIPTION
The indicative scope of works for the proposed investment Sub-projects in Arusha Municipality under the TSCP will include the following activities;

• **Cluster I:** Construction /upgrading/rehabilitation of approximately 30 km of roads to asphalt concrete (bitumen surfacing); including vertical and horizontal alignments, pavement design, concrete bridges, drainage structures, street lights, traffic lights, etc.

• **Cluster II:** Construction of approximately 0.5 km of lined storm water drains; including alignment and structural designs, etc. for flood control in the Central Business District (CBD).

• **Cluster III:** Construction of landfill at the Muriet solid waste dumpsite; including creation of additional waste cells, construction of 1 km inner roads, storm water drains and leachate stabilisation lagoons.

The project is essentially civil works in nature, Major works include

I. Cluster I: Construction of Roads
   - Site clearance;
The Provision of Consultancy Services for Preparation of Preliminary and Detailed Engineering Design, Cost Estimates, Bidding Documents
and Environmental and Social Impact Assessments for the Investments in Sub-projects
in ARUSHA Municipal Council under the Proposed Tanzania Strategic Cities Project.

- Filling and reshaping the roads to sub-grade level
- Upgrading or construction of longitudinal and cross drainage structures
- Provision of sub-base, base course and asphalt concrete.
- Demolition and removal of culverts and temporary bridges;
- Provision of temporary crossings and traffic diversions;
- Excavation of the existing roads and the construction of fill embankments;
- Shaping of gravel from borrow pits for sub-base and base;
- Supply of bitumen and stone chippings;
- Construction of storm water drainage channels for the roads
- Laying a bitumen prime coat and bituminous surface treatment;
- Excavation for the construction of the concrete culverts and incidental works;
- Construction of concrete culverts and incidental works.

2. Cluster II: Construction of Bondeni Drain
- Provision of temporary crossings and traffic diversions;
- Demolition/Excavation of the existing bitumen surface on the road and excavation of trenches;
- Filling and reshaping and levelling trenches;
- Lining of the trenches;
- Finishing the surface.

3. Cluster III. Construction of Landfill
- Modification of the site existing drainage (i.e. routing away the runoff from the landfill area);
- Construction of access roads and installation of weighing bridge;
- Excavation and preparation of landfill bottom and subsurface sides;
- Laying of the landfill liners;
- Installation of landfill gas control facilities;
- Installation of weigh bridge for measuring the weight of solid wastes;
- Construction of dump site office;
- Construction of leachate collection and treatment ponds.
- Construction of the fence for the dumpsite
- Construction of waste disposal cells in the dumpsite
- Construction of drainage channels for the solid waste disposal site
- Construction of disposal site access roads

STAKEHOLDER CONSULTATIONS AND PUBLIC INVOLVEMENT
Stakeholders Identification

Simple methods such as networks, literature review and interviews were used in the process of stakeholder identification. From one stakeholder, the team was connected to another and another stakeholder, in a chain like manner. The main stakeholders included Arusha Municipal Authorities, Ward Executive Officers in the

project areas, Urban Water Supply and Sewerage Authorities and TANESCO in Arusha Municipality. Other stakeholders were the communities, specifically in Lemara and Sokoni1 wards.

The overall goal of the consultation process was to disseminate Project information and to incorporate the views of stakeholders in the design of the Environmental and Social mitigation measures, management plan and Monitoring Plan. The specific aims of the consultation process are to:

- Improve Project design and, thereby, minimize conflicts and delays in implementation;
- Facilitate the development of appropriate and acceptable entitlement options;
- Increase long term Project sustainability and ownership;
- Reduce problems of institutional coordination and
- Increase the effectiveness and sustainability of income restoration strategies, and improve coping mechanisms.

From the consultations it can be said that the communities are very much interested to see that the Core urban infrastructures are improved. They could realize the benefits of the project in terms of economic and social growth and even improved health status. They appreciated the World Bank (IDA) and Tanzania government efforts to give its priority in improvement of the Municipal Infrastructure. However, the stakeholders consulted are worried about the expropriation of properties and compensation issues.

A summary of issues/concerns raised by different stakeholders is presented below:

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<tr>
<th>S/NO</th>
<th>ORGANIZATION/AUTHORITY</th>
<th>ISSUES/CONCERN</th>
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<tbody>
<tr>
<td>2.</td>
<td>AUWASA &amp; TANESCO</td>
<td>1. Destabilization and/or destruction of the existing infrastructures such as electric poles, water supply pipes and sewer lines along the project roads.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. The Municipal to work hand in hand with AUWASA &amp; TANESCO during the planning and design phases. Funds for moving out these infrastructures should be part and parcel of the budget for subprojects.</td>
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<tr>
<td></td>
<td></td>
<td>3. Temporal loss of access to water and electricity services for residents in the project area.</td>
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<td>4. Possible environmental pollution by sewage if the sewerage system is destroyed/broken during construction.</td>
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<td></td>
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<td>5. Should there be any construction activities near water source/rivers, the contractor should take care not to cause pollution of any kind to the source.</td>
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<td></td>
<td></td>
<td>6. Employment opportunity to the local people during the construction period.</td>
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<td>3.</td>
<td>Arusha Municipal Council</td>
<td>1. Reduced floods in the Municipality as a result of improvements of road drainage systems, especially in the CBD.</td>
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<tr>
<td>S/NO</td>
<td>ORGANIZATION/AUTHORITY</td>
<td>ISSUES/CONCERN</td>
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</table>
|      | (The municipal planners, environmental engineer, roads engineer, surveyor and the Wards executive officers and The general community in Sokon1, Sokon1 Engosenglu and Lemara) | 2. Employment opportunity to the local people during the construction period.  
3. Improved solid waste disposal services will definitely improve the environmental quality and health of people in the municipality.  
4. Improvement to the dumpsite will increase efficiency of the municipal solid waste management service providers in general  
5. Beautification of the municipal.  
6. The status of the municipal will be improved, land and property value will be raised, and new business will open along the roads.  
7. Reduced traffic congestion in the Municipality due to improved road network. Pot holes on the road create congestion because the vehicles have to slow down to avoid driving into the holes.  
8. Possible environmental pollution by sewage if the sewerage system is destroyed/broken during construction “the contractor should clearly state how the flowing sewage will be handled, in order to avoid environmental pollution by sewage”  
9. Temporal loss of access to services such as road, water supply and electricity during construction. “Residents will not appreciate prolonged water shortage period”  
10. Reduced floods in the Municipality as a result of improvements to roads drainage systems, especially in the CBD.  
11. Improved solid waste disposal service will definitely improve the environmental quality and health of people in the municipality.  
12. Concerns about the final disposal of collected leachate from the dumpsite. “What will happen to the sludge after collection and treatment in sludge ponds?”  
13. Construction of Bondeni drain will eliminate flooding, especially around the Main market area, and hence reduce the associated nuisance and health risks  
14. The consultant should make sure that the works are well designed and construction works are well supervised to ensure sustainability and to avoid soil erosion. “It has happened in other projects that some parts of the road or the road surface finish is eroded just after the completion of the construction works”  
15. The contactor should leave the working site clean before handing over the work.  
16. The contractor should use the existing borrow pits, stone quarries and sand pits in order to minimise the land degradation at new sites.  
17. Tourism and trade sectors will expand due to improvement of the town roads.  
18. Possible population influx into the project areas as a result of improved services. “Population influx is highly associated with spread of communicable diseases (i.e. HIV/AIDS) and competition for the limited resources.”  
19. Possible increased road accidents “improved roads - increased safety” |
POTENTIAL SIGNIFICANT ENVIRONMENTAL AND SOCIAL IMPACTS

The development of core urban infrastructure can cause a wide range of environmental and social impacts on a number of receptors. The impacts are of both positive and negative nature. The significant environmental and social impacts identified include:

Positive impacts;
- Improved Solid waste collection and disposal (Improved Sanitation);
- Improved storm water collection;
- Improved transportation services;
- Improved community life and services;
- Job creation and improved employment opportunities;

Negative impacts;
- Loss of natural habitat;
- Increased water and soil pollution;
- Soil erosion;
- Noise, vibration and air pollution;
- Safety and health risks
- Landscape modification
- Interference to local hydrology;
- Disruption of other infrastructure
- Immigration /influx of people from other areas;
- Increased spread of HIV/AIDS and other diseases
- Land expropriation and relocation/ resettlement

MITIGATION MEASURES AND ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

The options to minimize or prevent the identified adverse social and environmental impacts as well as a monitoring plan have been suggested in this report. Many of them are based on good engineering practices.
The ESMP describes the implementation schedule of the proposed mitigation measures as well as planning for long-term monitoring activities. It defines roles and responsibility of different actors of the plan. The associated environmental costs amount to USD 110,500. The estimated annual costs for carrying out the proposed environmental monitoring programme amounts to USD 95,840.

DECOMMISSIONING

Decommissioning is not anticipated for cluster I and II in the foreseeable future. However, Cluster III (the Landfill) will require decommissioning. Decommissioning will entail continued monitoring and maintenance of gas and leachate control systems.

The most important part of landfill closure and restoration plan, where ground water protection measures are in place, is to construct low permeability cover or cap, over the waste when the final elevations is reached. The following procedures are typically proposed to close and restore a landfill:

1. Cover all the waste
2. Permit sufficient time for settling of any recently deposited waste
3. Apply final cover
4. Grade final slopes to around 5%
5. Install permanent systems of surface drainage channels on the landfill
6. Check sediments and erosion control and modify according to any changes in slopes
7. Dissemble temporary structures (i.e. campsite) and waste receiving areas not required for the after use of the site
8. Seed the final cover with appropriate mixture of grasses.
9. Outline a timetable to ensure parameters requiring monitoring are well and timely monitored.

CONCLUSION

Implementation of the proposed Investment Subprojects in Arusha Municipality will entail no detrimental impacts provided the recommended mitigation measures are adequately and timely put in place. The identified adverse impacts shall be managed through the proposed mitigation measures and implementation regime laid down in this EIS. The Arusha Municipal Council is committed in implementing all the recommendations given in this EIS and further carrying out the environmental auditing and monitoring schedules.
**LIST OF ACRONYMS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AUWASA</td>
<td>Arusha Urban Water Supply and Sewerage Authority</td>
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<tr>
<td>BATNEEC</td>
<td>Best Available Technology Not Entailing Excess Cost</td>
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<tr>
<td>CBO</td>
<td>Community Based Organization</td>
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<tr>
<td>DoE</td>
<td>Division of Environment</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>EIS</td>
<td>Environmental Impact Statement</td>
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<td>EMA</td>
<td>Environmental Management Act</td>
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<td>EMP</td>
<td>Environmental Management Plan</td>
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<tr>
<td>ESMP</td>
<td>Environmental and Social Management Plan</td>
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<tr>
<td>HIV/AIDS</td>
<td>Human Immune Deficiency Virus / Acquired Immune Deficiency Syndrome</td>
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<td>IDA</td>
<td>International Development Association</td>
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<td>LGSP</td>
<td>Local Government Support Project</td>
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<td>NEMC</td>
<td>National Environment Management Council</td>
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<tr>
<td>NEP</td>
<td>National Environmental Plan</td>
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<tr>
<td>NGO</td>
<td>Non Governmental Organization</td>
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<td>NSGRP</td>
<td>The National Strategy for Growth and Reduction of Poverty</td>
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<tr>
<td>PMO-RALG</td>
<td>Prime Minister's Office, Regional Administration and Local Government</td>
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<tr>
<td>RAP</td>
<td>Resettlement Action Plan</td>
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<tr>
<td>SIA</td>
<td>Social Impact Assessment</td>
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<tr>
<td>STD</td>
<td>Sexual Transmitted Diseases</td>
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<tr>
<td>TAC</td>
<td>Technical Advisory Committee</td>
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<tr>
<td>TANESCO</td>
<td>Tanzania Electricity Supply Company</td>
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<tr>
<td>ToR</td>
<td>Terms of References</td>
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<tr>
<td>TSCP</td>
<td>Tanzania Strategic Cities Project</td>
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<tr>
<td>TTCL</td>
<td>Tanzania Telecommunication Company Ltd</td>
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<tr>
<td>UWASA</td>
<td>Urban Water Supply and Sewerage Authority</td>
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<tr>
<td>WB</td>
<td>World Bank</td>
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ACKNOWLEDGEMENT

The EIA team wishes to convey its sincere appreciation to all stakeholders who in one way or the other supported the completion of this work. Special thanks to the Arusha Secretariat and Arusha Municipal Councils for their prompt assistance during the fieldwork. The team also wishes to thank all the participating ward executive officers, TANESCO HQ in Arusha and the AUWASA for agreeing to cooperate with the team during the scoping exercise.
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1.0 INTRODUCTION

1.1 Project Background and Justification

The Permanent Secretary, Prime Minister's Office, Regional Administration and Local Government of the United Republic of Tanzania (GoT) have received a credit from the International Development Association (IDA) for the implementation of the Local Government Support Project (LGSP). It is intended that part of the proceeds of the credit will be used to cover eligible costs under the contract for the Provision of Consultancy Services for Preparation of Preliminary and Detailed Engineering Designs, Cost Estimates and Bidding Documents, and Environmental and Social Impact Assessments for the Investment Sub-Projects in Arusha Municipality under the proposed Tanzania Strategic Cities Project (TSCP). The LGSP, which is in an advanced stage of implementation, became effective in April 2005, and is expected to close on June 30, 2011.

The main project activities for the proposed investment Sub-projects in Arusha Municipality under the TSCP are mainly to improve the core urban infrastructures such as (i) Urban roads and drainage; including associated structures such as drainage ditches, culverts/bridges, footpath and street lighting; (ii) surface drainage collection and; (iii) solid waste management including collection, transport and disposal. In this report the subprojects have been clustered into three clusters, whereby, Cluster I: covers all roads, Cluster II: Storm drain and Cluster II: Construction of landfill.

The Indicative Planning Figure for the sub-projects in Arusha Municipality is T.Sh. 21 billion. The implementation of the subprojects is planned to be done in two phases, phase I and Phase II as will be described later in this report.

The history of Arusha started in 1890 when the Germans established their Boma. By that time Arusha extended 1.5 kilometres radius surrounding the boma. In 1940 British Colonies came in after defeating Germans and established the township authority in 1948. It continued to grow as an administrative, commercial, services and recreational centre mainly for European settlers. There was a remarkable growth of Arusha from 1967 to 2000 due to a number of factors including; it becoming the head quarters of the former East African Community, and home for the International Criminal Tribunal for Rwanda genocide. Other factors are related to its location and natural environment which made it a Tourist centre for the Northern circuit. Arusha is also a trading centre for the unique gemstone (Tanzanite)
1.2 Rationale of the SIA and EIA Studies

The SIA and EIA studies provide an analysis of the implications of the investment Sub-projects in Arusha Municipality to the social and biophysical environment in the project areas. The studies also provides mitigation plan to prevent or minimize adverse impacts to be caused by the intended Investment Subprojects. The SIA and EIA addresses key environmental and social aspects of the proposed investment Subprojects in relation to other land uses and community life in Arusha Municipality.

The principal legislation guiding EIA undertakings in Tanzania is the Environmental Management Act (EMA), Act No.20 of 2004 (Cap. 191). For matters pertaining to EIA, the EMA is operationalized through the EIA and Audit Regulations of 2005. According to these regulations, the National Environment Management Council (NEMC) manages the EIA process (screening and review of statements), which culminates by an award of an Environmental Certificate to the proponent by the Minister responsible for Environment. The Council (i.e. NEMC) determines the level of the EIA study after the project has been registered by the proponent.

The World Bank’s Operational Directive 4.01 on Environmental Assessment (now referred to as Operational Policy and Bank Procedure 4.01) requires that environmental assessments be undertaken in those categories of projects that have or are likely to have potentially significant impacts on the environment. Under this policy, projects are categorized as category A, B, or C according to type, scale, location and anticipated severity of environmental impacts.

This project essentially aims at rehabilitation/ construction of an existing urban infrastructure, it may be considered to fall under Category B because the construction sites are not virgin areas and significant environmental impacts have already occurred during their development. The environmental impact focus for a Category B project is usually on the repair or rehabilitation of prior environmental damage and ensuring that the environment is not subjected to significant new negative impacts. However, facilities such as the storm drainage system I and the Njiro-Mbauda road are non-existing and are addressed collectively with the rest of priority projects as one project.

Yet, there is a component of involuntary resettlement, which suggests that the categorization could be upgraded to A.
1.3 Project Development Objectives

The overall scope of the consultancy assignment comprises the preparation of preliminary and detailed engineering designs, drawings, cost estimates, suitable contract packages, final bidding documents and overall time-bound implementation schedules. It also involves the preparation of environmental and social impact assessments, preparation of environmental management plans and, where necessary, resettlement plans and indigenous people’s development plans, for all investment sub-projects proposed by the Arusha Municipality for financing under the core urban infrastructure sub-component of the TSCP.

1.4 The Scope of the EIA/ SIA Work

The scope of this work is outlined in the ToR (Appendix I) and includes;

- To make consultation with Government agencies, local communities and the private sector operating in the communities affected by the project.
- To review policies, legislation and administrative framework pertaining to this project and environment as a whole
- To establish an environmental baseline for the project areas in Arusha Municipality and description of the proposed construction works.
- To assess and quantify the potential environmental impacts resulting from the Investment Subprojects activities, especially within the zone of influence of the project.
- To identify key stakeholders and review on the adequacy of participatory approaches suggested.
- To assess and quantify the potential social impacts resulting from the establishment of the Investment Subprojects, and assess the target groups to be affected.
- To develop an Environmental Management Plan (EMP) detailing actions and responsibilities for impacts mitigation and monitoring.
- To assess resettlement issues (Resettlement Impact Analysis).

1.5 Methodology

1.5.1 Study Team and Scoping

In order to properly address the environmental issues, a team of experts participated in undertaking the EIA and SIA studies. The experts were Environmentalists, Civil Engineers and a Sociologist.
Scoping was done through consultation and interviews with various relevant stakeholders, reviewing various reports, studies and literature relevant to environment and core urban infrastructure development in Tanzania. Related EIA studies in Tanzania were reviewed in order to draw on existing knowledge and experiences. The information was further complimented by extensive field visits in the project area. The scoping exercise facilitated the identification of key stakeholders for the project and the main issues of concern to be addressed by the detailed EIA and SIA studies. The scoping exercise was conducted in September to early October 2009.

1.5.2 Field Studies and Public Participation

**Broader consultation:** The fieldwork for this study was carried out between September and October 2009. The fieldwork involved reconnaissance to all sub-projects making various observations, site visits and interviews with stakeholders as well as meeting relevant Arusha Municipality officials.

The field visits were essential to fully realize the scope of the project, the biophysical environment specific to the location and the socio-economic conditions in the project area. The information was collected from various sources including the Arusha Municipality officials and Ward Executive officers in the project sites, Urban Water Supply and Sewerage Authority, TANESCO and a few other relevant stakeholders.

Information and data collected include land use, ecosystems and human habitat, demography, hydrology, and other indicators related to environmental and socio-economic trends of the project area. Other information was appraised through key informants interviews and experts’ observations.

Public participation was considered as an important element of the process. In these EIA and SIA studies various stakeholders were involved. Broad consultations that involved local communities, wards and municipal officials were carried out. During these consultations, the local communities had opportunities to air their concerns. The concerns of each group have been addressed in chapter 5 of this Environmental and Social Impact Assessment report. The following methods were used during field studies to ensure effective public involvement;

- **Focus Group Discussions:** These discussions were held with specific and targeted groups in the society including women, youths and small business entrepreneurs, village leaders and environmental committees. Guiding questions or checklists were prepared to facilitate the discussions and to focus it on issues related to a particular group. Dynamics of focus group
discussions were observed to ensure fruitful discussions under the leadership of the sociologist. The names of participants in the discussions are attached in Appendix II.

- **Meetings with Government Authorities:** Brief meetings were held with heads of various departments of Arusha Municipal Council, ward leaders and beneficiaries of the subprojects. Meetings with authorities were held in their respective offices and involved few technical people. However, the meetings with communities in the project sites involved people from different backgrounds. First, a brief description of the project was given by the Sociologist before the opportunity for comments and questions was availed to the participants. The attendance and proceeding of the meetings were recorded by a secretary chosen among the attendees. Three public meetings were held in three different areas in Arusha Municipality. One of the meetings was held in Lemara ward while the other two were held in Sokoni1 ward, but in two different project areas. These meetings were intended to ensure that people are aware of the proposed undertakings in their areas, and the to give them room to discuss issues related to the project in an open manner thus fostering a community participatory approach prior to project implementation. Clarifications and affirmations were made with regard to the expected impacts on individuals and the community in general.

- **Direct observations:** Some facts were observed directly by the EIA team. The information obtained from this technique assisted the study team to have the starting point during subsequent one-to-one interviews with stakeholders.

- **Secondary information:** This information was obtained from existing reports including
  - World Bank Operational Policy 4.01
  - Arusha Municipality Socio-economic Profile (2008)
  - Arusha Strategic City Project (2009-2013) Documents
1.5.3 Project Impact Assessment

The approach of superimposing project elements onto the existing social and environmental natural conditions was used to identify the potential environmental impacts of the proposed Investment Subprojects. The checklist method has been used to identify the impacts and to recommend mitigation measures. Further, the environmental impact matrix method has been adopted to identify impacts of major concern. A key guiding assumption in this study is that the project will be designed, constructed, operated and maintained with due care for safety and environmental matters using current and practical engineering practice and/or Best Available Technology Not Entailing Excess Cost (BATNEEC). The implementation schedule of the mitigation measures is summarized in the Environmental Management Plan (EMP).

The environmental assessment has been undertaken in close interaction with the engineering planning and design team of UWP Consulting. In this process environmental impacts have been evaluated for various alternatives. Several project alternatives were considered including that of not implementing the project. The fundamental environmental protection strategy and environmental considerations influencing engineering design were incorporated. However, reasonable regard to technological feasibility and economic capability were taken into account. Inter alia, the assessment entailed the following:

Collection of Baseline Data

The collection of baseline data was conducted subsequent to defining the scope of the EIA. These data allows the study team to determine whether more detailed information on environmental conditions at the development site and its surroundings are needed and where such information can be obtained.

The sample of the study consisted mainly of ward division executives, committee members and the members of the general public who were considered to be potential affected persons and/or interested parties. All respondents were selected through convenient sampling techniques.

Both primary and secondary data were collected. Primary data were collected by direct measurement, questionnaires, observations and using semi-structured interviews with respective and targeted parties (as explained in the previous section). Secondary data were obtained from various relevant sources of information such as city and municipal profiles, wards, education and health reports and many other official and non official documents.
Review of Policies, Legal and Institutional Framework for Environmental Management

This allowed the study team to update and enhance their understanding of national policies, legislation and institutional arrangements for environmental management in Tanzania and relevant international procedures to ascertain the optimal management of impacts.

Identifying Environmental Impacts

This was undertaken by compiling a contender list of key impacts such as loss of flora and fauna, settlement patterns, social and cultural systems, water resources, land tenure systems etc;

Predicting Environmental Impacts

The environmental impacts were identified and their potential size and nature were predicted. The prediction of impacts specified the impact’s causes and effects and its secondary and tertiary consequences for the environment and the local community was assessed

Determining the Significance of Impacts

The key activity was to evaluate the significance of impacts, that is, judgments were made about which impacts found in the study area were considered important and therefore need to be mitigated.

Identifying Mitigation and Management Options

The options for dealing with identified and predicted impacts were considered. This enabled the study team to analyze proposed mitigation measures. A wide range of measures have been proposed to prevent, reduce, remedy or compensate for each of the adverse impacts evaluated as being significant. Analysis of the implications of adopting different alternatives was done to assist in clear decision-making.

1.6 Report Structure

This report is divided into nine (12) chapters:

Chapter 1 carries the Introduction to the report. Chapter 2 describes the proposed undertaking i.e. Investment sub projects in Arusha Municipality. Chapter 3 contains the policies, legal and administrative frameworks within which the EIA was carried out. Chapter 4 describes the project’s environmental and social setting. Chapter 5 covers involvement of stakeholders and public consultations. Chapter 6 provides the Identification, Assessment and Analysis of environmental and social impacts. Chapter 7 details the proposed mitigation measures. Chapter 8 gives the Environmental and Social Management Plan.
Chapter 9 covers the Environmental and Social Monitoring Plan. Chapter 10 describes the project. Chapter 11 contains the Cost Benefit Analysis of the Decommissioning and Demobilisation Plan, and the last Chapter 12 contain the Summary and Conclusion.

The appendices, containing some key primary information collected during the study are attached at the end of this report. Generally, the report structure flows in conformity with that specified in the World Bank OP 4.01 on Environmental and Social Impact Assessment and Tanzania EIA and Audit Regulations of 2005.
2.0 PROJECT BACKGROUND AND DESCRIPTION

2.1 Project background and Location

The Permanent Secretary, Prime Minister's Office, Regional Administration and Local Government of the United Republic of Tanzania (GoT) have received a credit from the International Development Association (IDA) for the implementation of the Local Government Support Project (LGSP). It is intended that part of the proceeds of the credit will be used to cover eligible costs under the contract for the Provision of Consultancy Services for Preparation of Preliminary and Detailed Engineering Designs, Cost Estimates and Bidding Documents, and Environmental and Social Impact Assessments for the Investment Sub-Projects in Arusha Municipality under the proposed Tanzania Strategic Cities Project (TSCP). The LGSP, which is in an advanced stage of implementation, became effective in April 2005, and is expected to close on June 30, 2011.

Arusha Municipality is the headquarters of Arusha Region located in northern Tanzania between latitude 2° and 6° south and longitudes 34.5° and 36° East (Figure 2.1). It has a unique character of being surrounded by Arumeru district in all directions. The Municipality is 50 km West of Kilimanjaro International Airport on the great North Road, halfway between Cape Town and Cairo.

Figure 2.1: Map of Tanzania Showing the Location of Arusha (www.maps.co).

Arusha Municipality is one of the six districts of Arusha Region which include Arumeru, Longido, Karatu, Arusha, Monduli and Ngorongoro (Figure 2.2). It is located on the Southern slopes of mount Meru at an altitude ranging from 1160 – 1450 metres above mean sea level.

Figure 2.2: Map of Arusha showing the district boundaries (UWP Consult)

Figure 2.3: Satellite image showing the project sites in Arusha Municipality (UWP Consult, 2009)

2.2 Project Components

The indicative scope of works for the proposed investment Sub-projects in Arusha Municipality under the TSCP will include the following activities;

- **Cluster I:** Construction /upgrading/rehabilitation of approximately 30 km of roads to asphalt concrete (bitumen surfacing); including vertical and horizontal alignments, pavement design, concrete bridges, drainage structures, street lights, traffic lights, etc.

- **Cluster II:** Construction of approximately 0.5 km of lined storm water drains; including alignment and structural designs, etc. for flood control in the Central Business District (CBD).
• **Cluster III:** Construction of landfill at the Muriet solid waste dumpsite; including creation of additional waste cells, construction of 1 km inner roads, storm water drains and leachate stabilisation lagoons.

The drainage system is non-existing. The construction of the roads will almost follow/retain the existing horizontal profile except for Njiro Mbauda Road. The improvements to the dumpsite shall concentrate only on the existing dumpsite area.

### 2.3 Project activities in general

#### 2.3.1 Mobilization phase

The duration of the mobilization phase is estimated to be about four (4) months. The mobilization phase will include the following activities:

a) Marking clearly the project sites boundaries and identification of structures and items to be cleared from the sites;

b) Identifying appropriate camping site(s) either as recommended by the EIS or others depending on the bidder’s preference

c) Construction and running the camp(s);

d) Procurement of construction equipment and machineries (otherwise owned by the construction company) including vehicles, bulldozers, excavators, vibrating rollers, concrete vibrators, generators and others;

e) Transportation of construction materials e.g. sand, gravel, cement, stones, timber, iron bars, and others;

f) Undertaking the auxiliary and preliminary works such as crushing of aggregates, locating sign posts and identifying sites for disposal of wastes.

The waste types which are likely to be generated during the mobilization phase include

- Spoil soils
- Plants including trees and grasses
- Food remains
- Sullage
- Oils and grease
Solid waste such as spoil soils will be hauled to the dump site and used as a fill material, while vegetation notably felled trees will be used as a source of energy in the camp sites. Scrap metals, used oil and grease will be sold for recycling purposes. Car maintenance and repair shall be done in proper garages.

2.3.2 Construction phase

The project is essentially civil works in nature mainly consisting of the following:

I. Cluster I: Construction of Roads

- Site clearance;
- Filling and reshaping the roads to sub-grade level;
- Upgrading or construction of longitudinal and cross drainage structures;
- Provision of sub-base, base course and asphalt concrete;
- Demolition and removal of culverts and temporary bridges;
- Provision of temporary crossings and traffic diversions;
- Excavation of the existing roads and the construction of fill embankments;
- Shaping of gravel from borrow pits for sub-base and base;
- Supply of bitumen and stone chippings;
- Construction of storm water drainage channels for the roads;
- Laying a bitumen prime coat and bituminous surface treatment;
- Excavation for the construction of the concrete culverts and incidental works; and,
- Construction of concrete culverts and incidental works.

II. Cluster II: Construction of Bondeni Drain

- Provision of temporary crossings and traffic diversions;
- Scrapping-off of the existing bitumen surface on the road and excavation of trenches;
- Filling and reshaping and levelling trenches;
- Lining of the trenches;
- Finishing the surface.

II. Cluster III. Construction of Landfill

- Modification of the existing drainage (i.e. routing away the runoff from the landfill area) at the site;
- Construction of access roads and installation weighing bridge;

- Excavation and preparation of landfill bottom and subsurface sides;
- Laying of the landfill liners;
- Installation of landfill gas control facilities;
- Installation of weigh bridge for measuring the weight of solid wastes;
- Construction of dump site office;
- Construction of leachate collection and treatment ponds;
- Construction of the fence for the dumpsite;
- Construction of waste disposal cells in the dumpsite;
- Construction of drainage channels for the solid waste disposal site; and,
- Construction of disposal site access roads.

Again, the waste types which are likely to be generated during the construction phase include:

- Spoil soils
- Demolished waste (excavated bitumen)
- Plants including trees and grasses
- Assorted default/damaged construction materials
- Food remains
- Sullage
- Oils and grease
- Scrap metals

Solid waste such as top soils will be used to fill the diversions, while vegetation notably felled trees will be used as source of energy in the camp sites. Scrap metals will be sold for recycling purposes. Oil and greases will be sold for recycling purposes or disposed of safely. Car maintenance and repair should be done in proper garages.
2.3.3 Operation phase

The actual usage of the facilities is expected to commence after completion of the construction works. This phase will mainly consist of the actual use of the facilities as well as the periodic maintenance of facilities and the environmental monitoring of some operations. For example, for the landfill the operation phase will include:

- Placement of the waste in cells;
- Waste compaction and provision of daily waste covers;
- Environmental monitoring of – dust, noise, leachate, landfill gas, and groundwater quality.

For roads, routine maintenance of the facilities will include resurfacing of the roads, removal of debris from storm water channels, clearance of vegetation along the road. The project facilities will be directly managed by the Arusha Municipal Council.

2.3.4 Decommissioning/Demobilization phase

Decommissioning of temporary structures will be done for proper restoration of the site (e.g. removing/spreading top-soils piled along the road, restoration of borrow pits to required grades and removing all temporary structures) Camp sites may be left to the local governments depending on agreements that will be reached during the mobilization phase.

Decommissioning of roads is not anticipated in a foreseeable future as Tanzania still needs more road network and cannot afford to abandon these roads.

After the landfill closure there should be adequate long-term maintained control, such as the control of landfill gases and leachate, to protect the surround environment.

2.4 Design Considerations

The following approved standards (Table 2.1) by the Ministry of Infrastructure Development (formerly the Ministry of Works –MoW) shall be adopted and adhered to.
**Table 2.1: Design Standards to be followed**

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<table>
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</thead>
<tbody>
<tr>
<td>3.</td>
<td>Specifications</td>
<td>MoW Standard Specifications for Road Works</td>
</tr>
<tr>
<td>5.</td>
<td>Structures</td>
<td>British Standards BS 5400</td>
</tr>
<tr>
<td>6.</td>
<td>Hydrology and Hydraulics</td>
<td>TRRL East African Flood Model</td>
</tr>
<tr>
<td>7.</td>
<td>Surveying</td>
<td>Land Survey and Mapping Standards of Tanzania (Land Surveying Regulations CAP 390)</td>
</tr>
</tbody>
</table>

### 2.5 Construction Materials and Labour Force

TANROADS Regional Office is finalizing the initial investigation on the construction materials for the construction activities in Arusha Municipality. The essential construction materials include iron bars, gravel, stone aggregates, sand, water, bitumen, landfill liners, leachate collection pipes and landfill gas vents, etc. All materials are available in the project area except landfill liners and bitumen, which will be imported by the contractor. Gravels will be obtained from the existing borrow pits (Figure 2.4) though more may have to be opened up during the construction stage if the need will arise. Table 2.2 shows the potential material sources (where samples were taken for investigation).

Figure 2.4: Commercial quarry operated by Arusha Aggregate Ltd near Arusha Municipality
(UWP Consult, 2009)

Table 2.2: Potential sources of material

<table>
<thead>
<tr>
<th>Region</th>
<th>Water</th>
<th>Sand Pits</th>
<th>Quarry Sites</th>
<th>Borrow Pit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arusha</td>
<td>Themi and Naura Rivers</td>
<td>Oljoro</td>
<td>Arusha Aggregate Ltd</td>
<td>Kisongo</td>
</tr>
</tbody>
</table>

(UWP Consult, 2009)

Construction works are generally a labour intensive undertaking. Apart from technical and skilled manpower, recruitment of unskilled labour will be done locally. It is estimated that more than 500 people will be employed (temporarily) by the sub-projects.

2.6 Waste Generation

The major wastes which will be generated from the project activities are spoil soils resulting from earthworks during the road formation and creation of borrow pits, packaging materials and assorted default/damaged construction materials. Waste minimization and recycling at the source shall be the first waste management option, which will be used.
The soils shall be stock piled along the road alignment or at the new borrow pits and later on be used for reinstatement of sites at the end of the project implementation phase, while the excess shall be disposed off in an environmentally friendly manner. Dust generation shall be minimised as much as possible by spraying water on the working site where it is practical.

Other waste streams will come from the campsites, which will include liquid wastes (domestic), general refuse and petroleum hydrocarbons. About 6-10 tonnes per month of domestic refuse will be generated at the campsites. A local disposal site shall be designated by the Contractor in collaboration with the communities’ leadership for disposal of solid wastes to be generated from project activities. Also, about 60 L/month of waste oils will be generated from maintenance of construction equipment and machines and vehicles. Sanitation facilities to be used in the camps will include ventilated improved pit latrines (VIP latrines) and septic tank/soak away. About 24 m³ per day of liquid will be generated from the campsites. Other contingent plans to handle the accidental oil spillages and general waste management shall be worked out during the preparation of the Environmental Management Plan (EMP) for this project.
3.0 POLICY, ADMINISTRATIVE AND LEGAL FRAMEWORK

3.1 Environmental Management Regulation in Tanzania

A clean and safe environment is the constitutional right of every Tanzanian citizen. Regulation on environmental management in the country is mainly vested on two public institutions, the National Environment Management Council (NEMC) and the Division of Environment (DoE) in the office of the Vice President. The NEMC undertakes enforcement, compliance, and review of environmental impact statements whereas the DoE provides the policy formulations and technical back-up and executes the overall mandate for environmental management in the country. The EIA certificate is issued by the Minister responsible for Environment. There are many policies and pieces of legislation on environmental management in Tanzania, the relevant ones to the proposed projects are briefly discussed below.

3.2 National Policies

Environmental awareness in the country has significantly increased in recent years. The government has been developing and reviewing national policies to address environmental management in various sectors. Among others, the objective of these policies is to regulate the development undertaken within respective sectors so that they are not undertaken at the expense of the environment. The National Policies that address environmental management as far as this project is concerned and which form the cornerstone of the present study include *inter alia*.

3.2.1 National Environmental Policy (NEP) of 1997

Tanzania currently aims to achieve sustainable development through the rational and sustainable use of natural resources and to incorporate measures that safeguard the environment in any development activities. The environmental policy document seeks to provide the framework for making the fundamental changes that are needed to bring consideration of the environment into the mainstream of the decision making processes in the country.

The National Environmental Policy, 1997 stresses that for a framework law to be effective, environmental standards and procedures have to be in place. For example, Chapter 4 of the policy (Instruments for Environmental; Policy), Section 61, states that “As part of the (National Environmental Policy)
strategy in the implementation of the National Environmental Guidelines, specific criteria for EIA conduct will be formulated”.

The National Environmental Policy as a national framework for environmental management emphasized that the transport sector shall focus on the following environmental objectives:

- Ensuring sustainability, security and the equitable use of resources for meeting the basic needs of the present and future generations without degrading the environment or risking health or safety
- To prevent and control degradation of land, water, vegetation and air which constitute our life support system
- To conserve and enhance our natural and man-made heritage, including the biological diversity of the unique ecosystem of Tanzania
- To improve the condition and productivity of degraded areas including rural and urban settlement in order that all Tanzanians may live in safe, healthful, productive and aesthetically pleasing surroundings.
- To raise public awareness and understanding of the essential linkages between environment and development and to promote individual and community participation in the environmental action
- To promote international co-operation on the environment and expand our participation and contribution to relevant bilateral, sub-regional, regional, and global organizations and programs, including implementation of treaties

With specific regard to the transport sector, the National Environmental Policy (in Section 51) focuses on the following

- Improvement in mass transport systems to reduce fuel consumption, traffic congestion and pollution;
- Control and minimization of transport emission gases, noise, dust and particulates;
- Disaster/spills prevention and response plans and standards shall be formulated for transportation of hazardous/dangerous materials.

Critically, the National Environmental Policy emphasize the following aspects of natural resources management taking into account that the project proposal has impacts on natural resources:

- Wildlife resources should be protected and utilized in a sustainable manner; and on the basis of careful assessment of natural heritage in flora and fauna, fragile ecosystem, site under pressure and endangered species, with participation of, and benefits to, the local communities. Environmentally adverse impacts of development project in wildlife conservation area e.g. (tourist hotels, road construction) will be minimized by Environmental Impact Assessment studies.
• It encourages the development of sustainable regimes for soil conservation and forest protection, taking into consideration the links between desertification, deforestation, freshwater availability, climatic change and biological diversity.

On addressing the issues of poverty alleviation, the policy recognizes its impact to the environment. The policy focuses on the satisfaction of basic needs of citizens with due cognizance to protecting the environment. This project will ensure that the above policy objectives are met.

The NEP advocates the adoption of Environmental Impact Assessment (EIA) as a tool for screening development projects which are likely to cause adverse environmental impacts.

3.2.2 National Transport Policy (2003)

The vision of this policy is “to have an efficient and cost-effective domestic and international transport service to all segments of the population and sectors of the national economy with maximum safety and minimum environmental degradation”. Its mission is to “Develop safe, reliable, effective, efficient and fully integrated transport infrastructure and operations which will best meet the needs of travel and transport at improving levels of service at lower costs in a manner which supports government strategies for socio-economic development whilst being economically and environmentally sustainable”.

In transport, the main objective of the policy is to improve infrastructure whilst minimizing wasteful exploitation of natural resources and enhancing environmental protection. Improving infrastructure assists in poverty reduction and eradication which is a major goal in Tanzania. Most activities in the project area depend in one way or another on the environment and therefore protection of the environment is vital.

In order to promote environmental protection whilst reducing poverty in rural areas, the policy direction is to:

• Influence use of alternative energy sources such as biogas and solar available at the residential localities instead of travelling long distances in search of firewood as a source of power; and
• Raise environmental awareness.

Sections 5.9 and 6.13 on Road Transport and Environment respectively give policy directions towards enhancing environmental protection through environmentally friendly and sustainable transport infrastructure both in the
rural and urban areas.

3.2.3 National Mineral Policy (1998)

The National Mineral Policy requires that mining activities are undertaken in a sustainable manner. Reclamation of land after mining activities is recommended. As far as this project is concerned, mining activities refer to quarrying and gravel extraction (borrow pits) activities.

3.2.4 Construction Industry Policy (2002)

Among the major objectives of the policy, include the promotion and application of cost effective and innovative technologies and practices to support socio-economic development activities such as road-works, water supply, sanitation, shelter delivery and income generating activities and to ensure application of practices, technologies and products which are not harmful to either the environment or human health.

3.2.5 National Land Policy (1995)

The National Land Policy states that, “the overall aim of a National Land Policy is to promote and ensure a secure land tenure system, to encourage the optimal use of land resources, and to facilitate broad - based social and economic development without upsetting or endangering the ecological balance of the environment”. This EIA partly responds to this requirement.

3.2.6 Energy Policy (2003)

The continuing decline in industrial and agricultural production during the period between 1980 and 1985 led to increased inflation and a decline in the standard of living. In order to arrest this decline, the Government gave priority to the rehabilitation of the basic economic infrastructure, especially communication, so that they can fully support the production sector. The energy policy considers the condition of roads as a determinant factor in vehicle energy use. Rough and pothole filled roads necessitate frequent braking and acceleration, leading to wasteful use of fuel; smooth, well-surfaced and well maintained roads lead to energy savings.
3.2.7 National Human Settlements Development Policy (2000)

Among the objectives of this policy to improve the level of the provision of infrastructure and social services for the development of sustainable human settlements and to make serviced land available for shelter to all sections of the community. Such infrastructure and services constitute the backbone of urban/rural economic activities. All weather roads and a reliable and efficient transport system, bus stands, drainage channels, and proper collection and disposal of solid waste are essential to increase productivity and the establishment of manufacturing industries.

3.2.8 National Gender Policy (1999)

The key objective of this policy is to provide guidelines that will ensure that gender sensitive plans and strategies are developed in all sectors and institutions. While the policy aims at establishing strategies to eradicate poverty, it puts emphasis on gender quality and equal opportunity of both men and women to participate in development undertakings and to value the role-played by each member of society.

This project will also ensure that women, who are the main users of the infrastructure, will be adequately involved at all levels of project planning to implementation.

3.2.9 The National Water Policy (2002)

The overall objective of this policy is to develop a comprehensive framework for the sustainable management of the national water resources. The policy seeks to ensure that water plays an important role in poverty alleviation. Section 2.15 notes that the size of Tanzania means that communication is time consuming and expensive. Inadequate communication systems (including poor roads) affect the effective implementation of water resources management activities in terms of higher cost of monitoring, supervision, management, policing and data transfer. These roads development will help to alleviate accessibility problems and thus facilitate the enhancement of water resources management within the project influence area.
3.2.10 The Tanzania 2025 Development Vision

The Tanzania Vision 2025 aims at achieving a high quality livelihood for its people attain good governance through the rule of law and develop a strong and competitive economy. Specific targets include:

1. A high quality livelihood characterized by sustainable and shared growth (equity), and freedom from abject poverty in a democratic environment. Specifically the Vision aims at: food self-sufficiency and security, universal primary education and extension of tertiary education, gender equality, universal access to primary health care, 75% reduction in infant and maternal mortality rates, universal access to safe water, increased life expectancy, absence of abject poverty, a well educated and learning society.

2. Good governance and the rule of law moral and cultural uprightness, adherence to the rule of law, elimination of corruption.

3. A strong and competitive economy capable of producing sustainable growth and shared benefits a diversified and semi-industrialized economy, macro-economic stability, a growth rate of 8% per annum, adequate level of physical infrastructure, an active and competitive player in regional and global markets.

Developing core urban infrastructure is one of the most important agents to enable Tanzania achieve its Development Vision objectives (both social and economic), such as eradicating poverty, attaining water and food security, sustaining biodiversity and sensitive ecosystems. Providing good urban infrastructure through this project contributes to the attainment of the 2025 Vision.

3.2.11 National Strategy for Growth and Reduction of Poverty

The National Strategy for Growth and Reduction of Poverty (NSGRP or “MKUKUTA” as known in Kiswahili) sets out the medium term strategy for poverty reduction and indicators for measuring progress. It defines the objectives for poverty eradication by 2010, with the following key priority areas for achieving its goal: (i) reducing poverty through equitable economic growth, (ii) improving human capabilities, survival and social well being, and (iii) containing extreme vulnerability among the poor. The NSGRP recognizes the heavy dependence of the poor on the environment (soil, water and forests), in particular household’s reliance on environmental resources for income generation. Sound urban infrastructures are key factor in the socio-
economic development and the fight against poverty. Providing good urban infrastructure through this project is in line with the MKUKUTA’s goals.

3.2.12 National Policy on HIV/AIDS (2001)

The National Policy on HIV/AIDS (2001) was formulated by the Government of Tanzania (GOT) under technical support from the World Health Organization Global Programme on AIDS (WHO-GPA) that led to the establishment of National HIV/AIDS Control Programme (NACP) under the Ministry of Health. However, due to its multi-sectoral nature there was a need to involve all sectors and community participation was found to be crucial. One of the government strategic initiatives is to establish Tanzania Commission for AIDS (TACAIDS) under the Prime Minister’s Office. The Commission provides leadership and coordination of national multi-sectoral response to the HIV/AIDS epidemic. The management functions, institutional and organizational arrangement of TACAIDS are outlined in the National Policy.

The Policy identifies HIV/AIDS as a global disaster, hence requiring concerted and unprecedented initiative at national and global levels. It recognizes HIV/AIDS as an impediment to development in all sectors, in terms of social and economic development with serious and direct implication on social services and welfare. Thus, the policy recognizes the linkage between poverty and HIV/AIDS, as the poor section of the society are the most vulnerable.

The main policy objective is reflected well in the establishment of TACAIDS. However, the policy has also set a number of strategic objectives to deal with specific HIV/AIDS problems:

- Prevention of transmission of HIV/AIDS;
- HIV Testing;
- Care for People Living with HIV/AIDS (PLHAS);
- Enhance Sectoral roles through participation and financial support;
- Promote and participate in research on HIV/AIDS-including dissemination of scientific information and development of HIV vaccine;
- Creating a legal framework through enactment of laws on HIV/AIDS-governing ethical issues and legal status of HIV/AIDS affected families;

Other objectives:

- monitoring and safeguarding rights of infected or affected people;
- prevent human rights abuse, discrimination and social injustice;
• provide effective treatment for opportunistic diseases;
• promote fight against drug substance abuse;
• prohibit misleading advertisements of drugs and other products for HIV/AIDS prevention, treatment and care.

3.3 Legal Framework

3.3.1 Environmental Management Act Cap. 191 (2004)

The Environmental Management Act (EMA) is a piece of legislation that forms an umbrella law on environmental management in Tanzania. Its enactment has repealed the National Environment Management Council Act, 19 of (1983) while providing for the continued existence of the National Environment Management Council (NEMC).

Among the major purposes of the EMA are to provide the legal and institutional framework for sustainable management of the environment in Tanzania; to outline principles for management, impact and risk assessment, the prevention and control of pollution, waste management, environmental quality standards, public participation, compliance and enforcement; to provide the basis for implementation of international instruments on the environment; to provide for implementation of the National Environmental Policy; to provide for establishment of the National Environmental Fund and to provide for other related matters.

Part III, Section 15(a) states that in matters pertaining to the environment, the Director of Environment shall coordinate various environment management activities being undertaken by other agencies to promote the integration of environment considerations into development policies, plans, programmes, strategies projects and undertake strategic environmental assessments with a view to ensuring the proper management and rational utilization of environmental resources on a sustainable basis for the improvement of the quality of human life in Tanzania.

Part VI of the EMA deals with Environmental Impact Assessments (EIA) and other Assessments and directs that an EIA is mandatory for all development projects. Section 81(2) states that “An Environmental Impact Assessment study shall be carried out prior to the commencement or financing of a project or undertaking”, while Section 81(3) states “a permit or licence for the carrying out of any project or undertaking in accordance with any written law shall not entitle the proponent or developer to undertake or to cause to be undertaken a project or activity without an environmental impact assessment certificate issued under this Act”.

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3.3.2 Environmental Impact and Auditing Regulations, (2005)

These regulations set procedures for conducting EIA and environmental audit in the country. The regulations are made from Section 82 and 230 of the EMA (2004) and prescribe that the Minister responsible for environment shall formulate regulations and guidelines on how EIA shall be conducted. The EIA regulations are applicable to all project contained in Third Schedule of the EMA (2004) and First Schedule of the EIA and Audit Regulations. These Regulations prescribes the stages and/or the EIA process, which are in principal managed by the NEMC.

3.3.3 The Land Act No. 4 of 1999 and the Village Land Act No. 5 of (1999)

These laws declare all land in Tanzania to be “Public land” to be held by the state for public purposes. The Acts empower the President of the United Republic of Tanzania, to revoke the “Right of Occupancy” of any landholder for the “public/national interest” should the need arise. The laws also declare the value attached to land.

LAND TENURE SYSTEM

The existing land ownership system has a history of more than forty years. At present the Land Act (1999) and the Village Land Act (1999) provide guidance to land ownership in Tanzania. The laws vest all land in the President and grant occupancy rights to individuals, legal persons and territorial communities. The President holds land in trust for all citizens and can acquire land for public use and benefit, for instance, to resettle people from densely populated areas to sparsely populated areas, settle refugees and so forth. The President can also acquire land for other national projects like the proposed Investment sub-projects.
COMPENSATION RULES

Under the Government Standing Order on expropriation for public utility, the holder of a Right of Occupancy is guaranteed a free enjoyment of the land and is entitled to compensation if dispossessed by the Government for public use. In many cases whilst the holders agree to leave their land they are not happy with the amount and delay of the compensation. Often, for example, improvements that they have made to the land are omitted or underrated. The expropriation should match the price that improvements can fetch if sold in the open market. Replacement value (defined as the cost of putting up a structure equivalent to the evaluated one) makes allowance for age, state of repair and economic obsolescence.

The compensation must therefore include:-

- The replacement value of the un-exhausted improvements
- Disturbance and transport allowance
- Loss of income
- Cost of acquiring or getting an equivalent land
- Actual value of the present property/utility available in the land and
- Any other immediate costs or capital expenditure incurred in the development of the land.

3.3.4 The Water Resources Management Act No. 11 of 2009

This is a new legislation that has repealed the Water Utilization (Control and Regulation) Act (1974). The Act provides for institutional and legal framework for sustainable management and development of water resources; outlines principles for water resources management; s for prevention and control of water pollution; and provides for participation of stakeholders and general public in implementation of the National Water Policy. Its main objective is to ensure that the nation’s water resources are protected, used, developed, conserved, managed and controlled in ways that among others meets the basic human needs of present and future generations, prevents and controls pollution of water resources and protects biological diversity especially the aquatic ecosystems.

Section 9 of this the law requires carrying out an Environmental Impact Assessment for any development in water resource areas or watershed. This ESIA is in line with this legal requirement.

3.3.5 The Water Supply and Sanitation Act No. 12 of 2009
This is also a new legislation that provides for sustainable management and adequate operation and transparent regulation of water supply and sanitation services; provides for establishment of water supply and sanitation authorities as well as community owned water supply organizations; and provides for appointment for service providers. The main aim of this law is to ensure the right of every Tanzanian to have access to efficient, effective and sustainable water supply and sanitation services for all purposes by taking into account among others protection and conservation of water resources and development and promotion of public health and sanitation; and protection of the interest of customers. This law is in line with this project because the project will improve the sanitation of the Arusha Municipality by the construction of the landfill.

3.3.6 The Road Act, 2007

For purposes of the Investment Subproject roads road upgrading project, the Act 2007 serves as a guide to the use of the road reserve. Contrary to previous informal understanding the reserve is exclusive to road related activities that do not include other utilities. However clause 29 (2) does give provision for the request and terms of approval for use of the road reserve by utilities such as power lines and water pipes.

On land acquisition the Act clearly states in part III, Section 16 that ‘where it becomes necessary for the road authority to acquire a land owned by any person, the owner of such land shall be entitled to compensation for any development on such land in accordance with the Land Act and any other written law’.

3.3.7 Antiquities Act of 1964 (as amended in 1979) and the Antiquities Rules of 1991

The Antiquities Act of 1964, as amended in 1979, and the Antiquities Rules of 1991 govern archaeological research in Tanzania. The main thrust of this legislation is that no archaeological research in Tanzania will be undertaken without the permission of the Director of Antiquities. The Director, under the Act, gives permission for qualified scientific personnel, both foreign and local, to undertake research after being satisfied that they possess adequate financial resources and professional competence. Excavation permits are issued for a period not exceeding one year at a time. Furthermore, where the need arises, artefacts export permits are issued for a period not exceeding three years at a time.
Under the 1964 Act, all objects (relics) that were made or modified by man before the year 1864 are automatically protected under the law whilst the Minister responsible for Antiquities can declare monuments and protect objects which were made or modified by man after the year 1863. The 1979 Amendment Act was passed to correct inherent deficiencies in the 1964 Act. For instance the collection and export of ethnographic objects without the permission of the Director of Antiquities was made illegal. Furthermore, the Act established the National Antiquities Advisory Council to advise the Government on matters related to the preservation, development and research of our archaeological heritage including publications and the establishment and maintenance of archaeological research facilities. Concurrently a National Antiquities Fund was established to complement government budgetary financing.

Section 16 of the 1964 Act (which was not amended in the 1979 Act) gives powers to Local Government Authorities, under the Local Government Ordinance, to pass by-laws (with the approval of the Minister responsible for Antiquities) with respect to the preservation of the archaeological heritage in their areas of jurisdiction.

### 3.3.8 The Urban Planning Act (2007)

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

Section 58 of the Urban Planning Act provides for protection of buildings or group of buildings of special architectural or historic interest. The law states “The planning authority may compile a list of areas, buildings or group of buildings of special architectural or historic interest and may amend any list so compiled, such areas may include; buildings, group of buildings, areas of unique biodiversity; and rare species of trees and special trees”. Section 59 gives powers to the Planning authority to grant permission for demolition of such buildings or otherwise powers to restrain any proposed demolition. Any building of special architectural or historic interest located in the road reserve and is to be demolished. This law is in line with this project.
3.3.9 Land Use Planning Act (2007)

The Act provides for the procedures for the preparation, administration and enforcement of land use plans; to repeal the National Land Use Planning Commissioning Act and to provide for related matters. Among the objectives of the Act as given in Section 4 are to facilitate the orderly management of land use and to promote sustainable land use practices. Development of Urban Infrastructure that affects land use and livelihood shall comply with the provisions of this Act. Any infringement on existing land use shall need consultation with land use planning authorities.

3.3.10 Occupation Health Safety (2003)

The law requires employers to provide a good working environment to workers in order to safeguard their health. The employers need to perform medical examinations to determine fitness before engaging employees. Employers must also ensure that the equipment used by employees is safe and shall also provide proper working gear as appropriate.


The Act gives authority to local governments to regulate matters that are local. A pertinent example of such authority to the Investment Subprojects 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.

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

These regulations provide criteria for the assessment of compensation on land, as per market value for real property; disturbance allowance is calculated as a percentage of market value of the acquired assets over twelve months; and transport allowance calculated at the cost of 12 tons hauled over a distance not exceeding 20 km. The other criteria includes loss of profit on accommodation based on business audited accounts and accommodation allowance equivalent to the rent of the acquired property per month over a 36 month period.
3.3.13 Explosives Act, 538

This Act requires all persons wanting to use explosives in their activities to hold an explosive license. For this Investment Subproject, this applies to use of material from any quarries and borrow pits where blasting is to be employed.

3.3.14 The Regional Administration and Local Government Act No 9, 1997

The Act provides for Regional Commissioners to oversee Regional Secretariats, with District Commissioners directly supervising the District Councils. Local authorities oversee the local planning processes, including establishing local environmental policies. The National Environmental Policy establishes a policy committee on Environment at Regional level chaired by the Regional Commissioner, mirrored by environmental committee at all lower levels, i.e. at the District, Division, Ward and Village or Mtaa Councils.

Under the EMA 2004, the Regional Secretariat is responsible for coordination for all advice on environmental management in their respective region and in liaison with the Director of Environment. At Local Government level, an Environmental Management Officer should be designated or appointed by each Municipal, District or Town Council. In each Municipality or District Environmental Committees should be established to promote and enhance sustainable management of the Environment. The Village Development Committee is responsible for proper management of the environment in their respective areas. The District Council designates for each administrative area as township, ward, village, sub-street and Environmental Management Officer to coordinate all functions and activities related to protection of environmental in their area.

3.3.15 Environmental Assessment and Management Guidelines for the Road Sector

The Environmental Assessment and Management Guidelines for the Road Sector (EAMGRS) were developed in December 2004, just after EMA (2004) was enacted. The guidelines give procedures for the EIA process as briefly explained in Table 3.1.

Table 3.1: Developed EIA Procedures in the Road Sector
EIA PROCEDURES IN THE ROAD SECTOR (as per EAMGRS 2004)

Administrative Procedures:

EIA administrative procedures vary based on the significance of the environmental impacts. The Minister for Environment is responsible for projects with potential major environmental impacts. The EIA of projects with potential non-major environmental impacts are carried out under the Ministry responsible for the road sector and the Road Sector-Environmental Section (RS-ES).

Environment Application and Screening Process:

EA procedures in the road sector are initiated when the Road Implementing Agency (RIA) submits an Environment Application Form to the RS-ES during the Project Identification or Project Planning/Feasibility Study Phase. An environmental screening of the proposed project will determine whether the project will require: An Initial Environmental Examination (IEE); a Limited Environmental Analysis (LEA); or a detailed Environmental Impact Assessment (EIA).

Environmental Screening is done based on the information presented in the Environmental Application Form. The RS-ES is responsible for screening projects and this may acquire a reconnaissance study by an environmental specialist, especially if the project traverses sensitive areas or when there is potential for complex environmental issues.

All road projects with non-major environmental impacts shall be subject to an Initial Environmental Examination (IEE) or a Limited Environmental Analysis (LEA). Projects with major environmental impacts are subject to EIA. The RS-ES will register non-major-impact projects. For major-impact projects, the registration is done by NEMC.

3.3.16 Mining Act (1998)

This Act states that “building material” includes all forms of rock, stones, gravel, sand, clay, volcanic ash or cinder, or other minerals being used for the construction of buildings, roads, dams, aerodromes, or similar works but does not include gypsum, limestone being burned for the production of lime, or material used for the manufacture of cement.

This act make sure minerals are well controlled and Section 6(1) states that no person shall, on or in any land to which this act refers, prospect for minerals or carry on mining operations except under the authority of Mineral Right granted, or deemed to have been granted under this Act.

3.3.17 The Land Acquisition Act 1967

Under the Land Acquisition Act, 1967, the President may, subject to the provisions of this Act, acquire any land for any estate or term where such land is required for any public purpose.
Land shall be deemed to be acquired for a public purpose where it is required, for example, for exclusive Government use, for general public use, for any Government scheme, for the development of agricultural land or for the provision of sites for industrial, agricultural or commercial development, social services, or housing or; where the President is satisfied that a corporation requires any land for the purposes of construction of any work which in his opinion would be of public utility or in the public interest or in the interest of the national economy, he may, with the approval, to be signified by resolution of the National Assembly and by order published in the Gazette, declare the purpose for which such land is required to be a public purpose and upon such order being made such purpose shall be deemed to be a public purpose; or in connection with the laying out of any new city, municipality, township or minor settlement or the extension or improvement of any existing city, municipality, township or minor settlement; etc.

Upon such acquisition of any Land the President is compelled on behalf of the Government to pay in respect thereof, out of moneys provided for the purpose by Parliament, such compensation, as may be agreed upon or determined in accordance with the provisions of the Land Acquisition Act, 1967.

The President may also revoke a right of occupancy if in his opinion it is in public interest to do so. Accordingly, the land for which a right of occupancy has been revoked reverts back to the Government for re-allocation pursuant to the existing need (s). It should also be noted here that, though the land belong to the government some changes on the land act has taken place. Land has value to the owner; therefore any land taken from the user has to be compensated. Based on this act the villagers affected by the project are claiming that they should be compensated for the lost properties including buildings and land used for residential purposes.
3.4 World Bank EIA requirements

3.4.1 World Bank Environmental Regulations

The World Bank’s Operational Directive 4.01 on Environmental Assessment (now referred to as Operational Policy and Bank Procedure 4.01) requires that environmental assessments be undertaken in those categories of projects that have or are likely to have potentially significant impacts on the environment. Under this policy, projects are categorized as category A, B, or C according to type, scale, location and anticipated severity of environmental impacts. The category indicates the scope and detail required for the EIA. These categories are presented in Table 3.1.

Table 3.2: Categories for Environmental Assessment

<table>
<thead>
<tr>
<th>Category</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A full (comprehensive) EIA is normally required as the project may have significant adverse impacts that may be sensitive, irreversible and diverse. These are mainly new construction projects</td>
</tr>
<tr>
<td>B</td>
<td>More limited environmental analysis is appropriate, as the project may have specific environmental impacts and mitigation measures can be more easily designed. Projects under this category entails rehabilitation, maintenance or rehabilitation rather than new construction</td>
</tr>
<tr>
<td>C</td>
<td>Environmental analysis is normally unnecessary. Projects focus on education, family planning, health and human resources development</td>
</tr>
</tbody>
</table>

As may be seen, in strict accordance with the guidelines, as this project is the rehabilitation of an existing urban infrastructure, it may be considered to fall into Category B because the most are the project sites are in use now and significant environmental impacts have already occurred during their initial construction. The environmental impact focus for a Category B project are usually on the repair or rehabilitation of prior environmental damage and ensuring that the environment is not subjected to significant new negative impacts.

Nevertheless, there is a component of involuntary resettlement, which suggests that the categorization could be upgraded to A.

Regarding resettlement, the Bank guidelines prescribe measures to minimize the negative impacts and ensure that the displaced community benefits from the project. Therefore the Policy requires that displaced person should be:
• Compensated for their losses at full replacement cost prior to the actual move;
• Assisted with the move and supported during the transition period in the resettlement site;
• Assisted in their effort to improve their former living standards, income earning capacity, and production levels, or at least restore them
• Integrated socially and economically in to host communities so that adverse impacts on host communities are minimized. The best way of archiving this integration is for resettlement to be planned through consultation involving affected people and future hosts and affected people

In addition, land, housing, infrastructure, and other compensation should be provided to the adversely affected population, indigenous groups, ethnic minorities, and pastoralists who may have customary right to the land and other resources taken for the project. The absence of legal title to land by such groups should not be a bar to compensation.

3.5 Institutional Framework

3.5.1 Overall Management Responsibility

The institutional arrangement for environmental management in Tanzania is well spelt out in the EMA (2004). There are seven (7) institutions mentioned by the act, of which the Minister Responsible for the Environment is the overall in-charge for administration of all matters relating to the environment.

Part III, Section 13(1) of EMA (2004) states that the Minister responsible for environment shall be in overall incharge of all matters relating to the environment and shall in that respect be responsible for articulation of policy guidelines necessary for the promotion, protection and sustainable management of environment in Tanzania.

The legal institutions for environmental management in the country include;

• National Environmental Advisory Committee;
• Minister responsible for Environment;
• Director of Environment;
• National Environment Management Council (NEMC);
• Sector Ministries;
• Regional Secretariat;
• Local Government Authorities (Municipal, District, Township, Ward, Village, sub-village “Mtaa and Kitongoji”)
3.5.2 National Environmental Advisory Committee

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

- Examine any matter that may be referred to it by the Minister or any sector Ministry relating to the protection and management of the environment;
- Review and advise the Minister on any environmental plans, environmental impact assessment of major projects and activities for which an environmental impact review is necessary;
- Review the achievement by the NEMC of objectives, goals and targets set by the Council and advise the Minister accordingly;
- Review and advise the Minister on any environmental standards, guidelines and regulations;
- Receive and deliberate on the reports from Sector Ministries regarding the protection and management of the environment;
- Perform other environmental advisory services to the Minister as may be necessary.

3.5.3 Minister Responsible for Environment

The Minister is responsible for matters relating to environment, including giving policy guidelines necessary for the promotion, protection and sustainable management of the environment in Tanzania. The Minister approves an EIA and may also delegate the power of approval for an EIA to the DoE, Local Government Authorities or Sector Ministries. The Minister also:

- Prescribes (in the regulations) the qualifications of persons who may conduct an EIA;
- Reviews NEMC reports on the approval of an EIA;
- Issues an EIA certificate for projects subject to an EIA;
- Suspends an EIA certificate in case of non-compliance.

3.5.4 Director of Environment

The Director of Environment heads the Office of the Director of Environment and is appointed by the President of the United Republic of Tanzania. The functions of the Director of Environment include:
• Coordination of various environmental management activities undertaken by other agencies;
• Promotion of the integration of environmental considerations into development policies, plans, programmes, strategies, projects;
• Undertaking strategic environmental risk assessments with a view to ensuring the proper management and rational utilization of environmental resources on a sustainable basis for the improvement of quality of human life in Tanzania;
• Advise the Government on legislative and other measures for the management of the environment or the implementation of the relevant international environmental agreements in the field of environment;
• Monitoring and assessing activities undertaken by relevant Sector Ministries and agencies;
• Preparation and issuing of reports on the state of the environment in Tanzania through relevant agencies;
• Coordination of issues relating to articulation and implementation of environmental management aspects of other sector policies and the National Environment Policy

3.5.5 National Environment Management Council (NEMC)

The NEMC's purpose and objective is to undertake enforcement, compliance, review and monitoring of EIA's and to facilitate public participation in environmental decision-making.

According to the Environmental Management Act (2004) the NEMC has the following responsibility pertaining to EIA in Tanzania:

• Registers experts and firms authorized to conduct EIA;
• Registers projects subject to EIA;
• Determines the scope of the EIA;
• Set-ups cross-sectoral TAC to advise on EIA reviews;
• Requests additional information to complete the EIA review;
• Assesses and comments on EIA, in collaboration with other stakeholders,
• Convenes public hearings to obtain comments on the proposed project;
• Recommends to the Minister to approve, reject, or approve with conditions specific EIS;
• Monitors the effects of activities on the environment;
• Controls the implementation of the Environmental Management Plan (EMP);
• Makes recommendations on whether to revoke EIA Certificates in case of non-compliance;
• Promotes public environmental awareness;
• Conducts Environmental Audits
The council has established zonal offices in Mbeya municipality, Mwanza city and Arusha municipality. The Arusha office serves the Northern zone. Currently the office is operated by three technical personnel, reporting to NEMC head office in Dar es Salaam city.

3.5.6 Sector Ministries

The existing institutional and legal framework the Sector Ministries are required to establish Sector Environmental Sections headed by the Sector Environmental Coordinator.

The Sector Ministries’ Environmental Sections;

- Ensure environmental compliance by the Sector Ministry;
- Ensure all environmental matters falling under the sector ministry are implemented and report of their implementation is submitted to the DoE;
- Liaise with the DoE and the NEMC on matters involving the environment and all matters with respect to which cooperation or shared responsibility is desirable or required;
- Ensure that environmental concerns are integrated into the ministry or departmental development planning and project implementation in a way which protects the environment;
- Evaluate existing and proposed policies and legislation and recommend measures to ensure that those policies and legislation take adequate account of effect on the environment;
- Prepare and coordinate the implementation of environmental action plans at national and local levels;
- Promote public awareness of environmental issues through educational programmes and dissemination of information;
- Refer to the NEMC any matter related to the environment;
- Undertake analysis of the environmental impact of sectoral legislation, regulation, policies, plans, strategies and programmes through strategic environmental assessment (SEA);
- Ensure that sectoral standards are environmentally sound;
- Oversee the preparation of and implementation of all EIA’s required for investments in the sector;
- Ensure compliance with the various regulations, guidelines and procedures issued by the Minister responsible for the environment and;
- Work closely with the ministry responsible for local government to provide environmental advice and technical support to district level staff working in the sector.
3.5.7 Regional Secretariat

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

- Advises local authorities on matters relating to the implementation of and enforcement of environmental laws and regulations;
- Creates a link between the region and the DoE and the Director General of the NEMC.

Arusha Regional Secretariat has no Regional Environmental Management Officer, all Environmental issues in the Municipality are handled by the Municipality Environmental Officers.

3.5.8 Local Government Authorities

Under the Local Government Act of 1982 (Urban and District Authorities), Local Government Authorities include the Municipal Councils, District Councils, Town Councils, Township, Kitongoji, Ward, Mtaa and Village. The Environmental Management Committee of each jurisdiction:

- Initiates inquiries and investigations regarding any allegation related to the environment and implementation of or violation of the provisions of the Environmental Management Act;
- Requests any person to provide information or explanation about any matter related to the environment;
- Resolves conflicts among individual persons, companies, agencies non-governmental organizations, government departments or institutions about their respective functions, duties, mandates, obligations or activities;
- Inspects and examines any premises, street, vehicle, aircraft or any other place or article which it believes, or has reasonable cause to believe, that pollutant or other articles or substances believed to be pollutant are kept or transported;
- Requires any person to remove such pollutants at their own cost without causing harm to health and;
- Initiates proceedings of civil or criminal nature against any person, company, agency, department or institution that fails or refuses to comply with any directive issued by any such Committee.

Under the Environmental Management Act (2004), the City, Municipal, District and Town Councils are headed by Environmental Inspectors who are responsible for environmental matters. The functions of the inspectors are to:

- Ensure enforcement of the Environmental Management Act in their respective areas;
- Advice the Environmental Management Committee on all environmental matters;
- Promote awareness in their areas on the protection of the environment and conservation of natural resources;
- Collect and manage information on the environment and the utilization of natural resources;
- Prepare periodic reports on the state of the local environment;
- Monitor the preparation, review and approval of EIA’s for local investors;
- Review by-laws on environmental management and on sector specific activities related to the environment;
- Report to the DoE and the Director General of the NEMC on the implementation of the Environmental Management Act and;
- Perform other functions as may be assigned by the local government authority from time to time.

Arusha Municipality has got an Environmental Management officer who heads the section of Environment under the department of Health and Environment. Due to the presence of this section there is no Environmental Committee in Arusha Municipality. Therefore all issues concerning environmental management during and after construction of sub-projects will be handled by this section.
4.0  BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

4.1  Spatial, Institutional and Temporal boundaries

4.1.1  Spatial boundaries

Arusha Municipality is the headquarters of Arusha Region located in northern Tanzania between latitude 2° and 6° south and longitudes 34.5° and 36° East It boarded by Arumeru district in all directions. The Municipality is 50 km West of Kilimanjaro International Airport on the great North Road, halfway between Cape Town and Cairo.

The spatial dimension encompasses the geographical spread of the impacts regardless of whether they are short term or long term. The spatial scale considers the receptor environmental component and can be local or broader. Following this, two zones of impacts are considered;

*The core impact zone:* This includes the area immediately bordering the project (local). In the case of this project local impacts will include the site of the construction (borrow areas, quarries and the actual sub projects) and the immediate surrounding areas.

*The zone of influence:* This includes the wider geographical areas that are influenced by this project (in Arusha Municipality).

4.1.2  Institutional boundaries

Institutionally, Arusha Municipality have the mandate to develop and maintain the urban infrastructures in the Municipality. The primary function of the municipalities includes the maintenance and development of the infrastructures to support the economic and social development of in the Municipality. They will also be responsible for addressing the environmental issues posed by the subprojects. Roads and storm water drainage will be under the municipal Civil Engineer while solid waste collection and disposal will be under the Municipal Environmental officer.

From the central government line of administration, by virtue of their location, the urban infrastructures to be developed by this project in Arusha is under the jurisdiction of the Regional Commissioner.
4.1.3 Temporal boundaries

With the exception of the dumpsite, all other sub-projects being improved under TSCP are not expected to stop being used so long as they are habitually maintained and operational although each infrastructure will have its own design life.

Conversely because of a number of reasons the Government may wish to do one or several decisions. For instance, abandoning a portion of the infrastructure and creating another one or an alternative portion; and diverting the original course and substituting it with a new one. Other measures are expanding the infrastructure because of several reasons; and if there is a decision for closing the infrastructure permanently then the required activities for decommissioning process will be obligatory.

4.2 Physical Environments

4.2.1 Climatic Conditions and Rainfall

Despite its proximity to the equator, Arusha's elevation of 1400 m on the southern slopes of Mount Meru keeps temperatures down and alleviates humidity. Cool dry air is prevalent for much of the year. The temperature ranges between 13°C and 30°C with an average around 25°C. The cold season is between mid April and mid August, while the rest months of the years are warm. Arusha has distinct wet and dry seasons, and experiences an eastern prevailing wind.

The district experiences two rainy seasons in which short rains are between October and January, while long rains are between March and May. Amounts of rains in these two seasons’ ranges between 500 to 1200 mm per annum with a means average of 844 mm. Arusha is considered to be one of the best African cities when it comes to great weather and tourism attractions.

4.2.2 Topography and Drainage

Arusha lies at an altitude between 1500 and 2100 m a.m.s.l. Water demand in Arusha Municipality and its environs has increased to about 5.3% annually since 1999. Groundwater levels have declined. The north-western part of Arusha is the most vulnerable to overdraft and possible serious environmental impacts. The Loruvani area has the most potential for aquifer
development due to its permeability, high recharge rate, massive aquifer thickness and low drawdown.

4.2.3 Area and Administrative structure

Administratively, Arusha Municipality has three divisions namely; Themi, Elerai and Suye which are subdivided into seventeen wards. These wards are Kati, Sekei, Themi, Kaloleni, Levolosi, Ngarenaro, Unga Limited, Daraja Mbili, Baraa, Sokon I, Elerai, Kimandolu, Oloirien, Sombetini, Terrat, Engutoto and Lemara. There are ten villages in the rural part of the Municipality. The Municipality has a total area of 93 km² [9,300 hectares] out of 34,526 km² (0.3%) of the total area of Arusha Region.

4.2.4 Population

Like all other urban centres in Tanzania, Arusha Municipality faces socio-economic problems arising from rapid growth of urban population attributed by natural growth, rural-urban migration, urban-urban migration and foreign immigrants. It has the highest population density [3040 people per sq km] in Arusha Region. The population projection is estimated at 359,044 people, however, over 100,000 people comes into Municipality in day time and leave in the evening. Annual intercessor growth rate is estimated at 5.4% (2002 Census).

The high population influx to Arusha is mainly due to two reasons. First, Arusha being a tourist town, the tourism business has flourished in recent years and second, is due to the municipality being the main market for minerals from Mererani mines (The TANZANITE).

Figure 4.1: Population growth trend in Arusha Municipality Arusha Strategic City Project (2009-2013)

4.3 Economic Activities

4.3.1 Social Economic Development

The economy of Arusha Municipality depends on commerce, Industry, small scale Agriculture and tourism. Commerce and Industrial activities contribute significantly to the GDP of the Municipality. 52% of employed people are in business operations, 14% employed in office work, 17% is Casual Labour and 19% are in agriculture while the remaining 6% are employed in Industries.

4.3.2 Industries

The main industries in Arusha Municipality are Tanzania Breweries Ltd, Sun flag, Tanzania Pharmaceutical Industries [TPI], A to Z,(Treated mosquito net industry), Kilima Bottlers, MB Super Food, Sunkist, Jumbo Mills, Tanfoam Industries, National Milling Corporation, ABB Tanelec, and Arusha Meat Company.

In addition to these, there are about 200 small scale industries all over the town, but SIDO area accommodates more than 10 small scale industries.
However some have closed down due to lack of raw materials, poor management, financial constraints and stiff competition from imported commodities.

### 4.3.3 Commerce and Trade

Commerce and Trade is among the major pre-occupations of the people of Arusha Municipality. Arusha town is the largest commercial center in North Eastern Tanzania where both local and imported goods and services are sold and bought. Customers satisfy their needs in an open market.

Commercial activities include wholesale and retail trades taking place mainly in the Central Business District area and in Elerai, Sombetini, Unga Ltd, Them, Lemara, kaloleni, Sekei, Engutoto and Ngarenaro wards.

### 4.3.4 Marketing

Arusha Municipal Council is a business centre. It is estimated to have more than 7,500 traders/Entrepreneurial activities are ranging from tour operators, forex shops hand crafts, etc. There are also retail and wholesale shops, Financial Institutions, International Conference Centre and a new bus terminal.

There are three major markets and four small markets. The biggest of the above are Central and Kilombero Markets. The smaller ones include Kijenge, Sanawari and Mbauda markets. There are informal markets locally known as Soko mjinga-these include Mapunda, Unga Ltd, Sombetini and Olmatejoo.

### 4.3.5 Tourism

Arusha is a local and international tourism center on the Northern part of Tanzania. It is also serving as a transit point for tourists heading to the National Parks and to the highest mountain in Africa [The Kilimanjaro]. It links to international destinations through Kilimanjaro International Airport. As the Northern tourism circuit, it receives the majority of tourists to the country. There are eleven tourist hotels, 84 registered tour operator companies and an international conference centre (AICC). Arusha Municipality is the major urban centre in the Northern Tourist Circuit. The Circuit is famous world-wide for its closeness to: Mount Kilimanjaro, Arusha National Park, Lake Manyara National Park, Tarangire National Park, Ngorongoro Crater, Olduvai Gorge and Serengeti National Park:
4.4 Services in Arusha Municipality

4.4.1 Transport and Communication
The Arusha Municipality is linked to other parts of Tanzania by Air through Kilimanjaro International Airport and the local Air port (Kilima Anga), and the road network. Within the Municipality there are 334.7 kilometers. Out of this total length 64.8 km is tarmac, 54 km is gravel with 196 km earth road.

24.7km are under TANROADS (they form part of the National Trunk Road), while the rest are under the Arusha Municipal Council. All the roads under the Municipal boundary (310 km) are the responsibility of the Council for maintenance.
The past three years data show that Arusha municipal council has been increasing funding for road networks from its own source. The financial year 2005/2006 used 3.38%, 2006/2007 used 5.39% and 2007/2008 used 13.38% of the Municipal Council own source revenue for maintenance and operation of the roads.

4.4.2 Water supply

Arusha residents depend on 15 boreholes, 2 springs. Out of 15 boreholes only two are located within the Municipal boundaries and 13 are in Arumeru district. The 2007/2008 data revealed that daily water production was 42,466 m$^3$ whereas the daily water demand estimated to be 53,030 m$^3$ within the difference of 564 m$^3$ this indicates the magnitude of water supply crises.

4.4.3 Liquid Waste Management

Arusha Municipality handed over the management of sewerage system to Arusha Urban Water Supply and Sewerage Authority in 1998 and remained with liquid waste management for those customers who are not connected to the main sewer. The existing waste management system varies according to existing settlement patterns. The sewer network consists of sewer pipes 43.03 km long; ranging from 100 mm to 600 mm in diameter. The service coverage is about 16.68% which is very low and covers the Central Business District only. Stabilization ponds are used for wastewater treatment (Figure 4.4).
Management of liquid waste in unplanned areas is difficult due to poor accessibility by cesspit emptier. In some locations within unplanned settlements there is little space for erection of pit latrines and the water table is high, so the situation in unplanned areas is filthy and pathetic. The room for such services has been secured in upgraded areas of Elerai, Daraja mbili, Ngarenaro and Unga Ltd. In planned settlements 78% of total households use septic tanks, 8% use latrines and 14% use conventional central sewerage system. In rural areas [villages] 90% of households use pit latrines 9% have no proper latrines and only 1% use septic tanks connected to soak pits.

4.4.4 Solid waste management

The Council Health department carries out solid waste management in Arusha Municipality. Solid waste generated in the Municipality is composed of household, market, commercial, institution, building materials, street waste, vehicle repair waste [metal scrap], and waste from local shoemakers and leather materials.

Refuse generated is estimated at an average of 410 tones per day basing on population and rate of generation per capital per day’ but only 160 tons which is approximately to 40% is collected and disposed off. The remaining 60% is not collected due to limited number of required refuse collection trucks and other equipment thus resulting into serious environmental pollution especially at garbage collection centres. Improper disposal of solid waste in
storm collection drain has resulted into clogging of the drains. This has in turn created a nuisance in terms of floods or even the drains becoming breeding sites for disease vector. The municipal waste is ultimately crudely disposed off in Muriel dumpsite.

**Figure 4.5:** Right: waste collection from the central market. Left: solid waste deposited in storm drains.
(UWP Consult, 2009)

There are few individuals engaged in waste recycling program in Sokoni1 ward. An example is the ‘Maendeleo Used Plastic & Paper Processing’. The company is located in Sokoni1 ward, a few kilometres from the dumpsite, and is privately owned. The waste is brought in by individual collectors/scavengers. Types of waste handled include Plastic bottles, paper, cardboard, plastic containers, metals and aluminium. The market for the recycled components includes;
Table 4.1: Waste components handled at Maendeleo Company

<table>
<thead>
<tr>
<th>S/N</th>
<th>Component</th>
<th>Level of handling</th>
<th>Customer/ market</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plastic bottles (water and juice containers)</td>
<td>Washing, compressing and packaging</td>
<td>Dar es Salaam (Chinese based company)</td>
</tr>
<tr>
<td>2</td>
<td>Paper, cardboard, boxes etc</td>
<td>Shredding compressing and packaging</td>
<td>Kenya (Ken Plastic Limited)</td>
</tr>
<tr>
<td>3</td>
<td>Simtanks, buckets,</td>
<td>Washing, Shredding compressing and packaging</td>
<td>Kenya (Ken Plastic Limited)</td>
</tr>
<tr>
<td>4</td>
<td>Metal parts, aluminium,</td>
<td>Cutting and packing</td>
<td>Local industries in Arusha</td>
</tr>
</tbody>
</table>

Figure 4.6: One of the machines used to process the waste at Maendeleo Co. (UWP Consult, 2009)

Figure 4.7: Plastic bottles just delivered at Maendeleo Co Ltd. (UWP Consult, 2009)

4.5 Existing Situation

4.5.1 Roads
Only 6.5 km (Njiror-Mbauda Road) is of earth surface. The remaining roads are of gravel or regarded bitumen. The condition of the roads is very poor in many cases (Figure 4.8). Most of them have no/or have poor/damaged surface drainage system.

4.5.2 The Bondeni drainage

There are no drainage channels at Bondeni area. The proposed channels will be 0.5 km long and it will be located in the CBD, near the central market. The drainage system is meant to reduce floods, which have been a major disaster in these areas. The drain capacity shall depend on the amount of runoff in the area. The alignment of the drainage system will be along roads/footpaths, so as to avoid encroaching private land.
4.5.3 The Dump site

The Muriet solid waste dumpsite is located in Sokoni1 ward, in Arusha Municipality. The municipal practices open dumping, leading to absolutely unsanitary conditions in and around the dump site. The sanitary condition inside the dump is very poor. The waste is being dumped haphazardly. Although the dump is fenced, scavengers are freely allowed into the dump. There is no checkpoint at the gate. The dump fires are common, accompanied with the unpleasant (and possibly toxic) smokes.

The dumpsite is surrounded by residential houses. Dust, smoke, wind-blown papers and flies flanks the air around the residences close to the site.

There are about 20 houses in the dumpsite buffer zone (i.e. 100 m perimeter) currently their property are being evaluated so that they are compensated and relocated before the construction of the landfill. The associated costs will be improved in the valuation reports.

According to the Municipal Environmental Engineer and the people living near the dumpsite, during rain seasons the dump releases a lot of leachate which is carried with storm water into the adjoining Burka River. Water from Burka River is used by nearby residents for domestic use especially washing as Figure 4.12 shows.

Figure 4.11: Left: the condition the inner roads. Right: typical waste dumping
(UWP Consult, 2009)

Figure 4.12: Left; Locals drawing water form River Burka: Right; Residential houses near the landfill site
(UWP Consult, 2009)

The landfill shall be designed to contain lines to intercept leachate. It shall also contain pipes for collection and transportation of leachate to a leachate pond that shall be constructed at site (Figure 4.13). Before its construction, all surface run-offs shall be routed away from the landfill site to avoid its contamination.
Figure 4.13 The proposed layout of the landfill site.

Figure 4.14 Landfill phasing out schematic diagram

Figure 4.15 Layout of landfill liners
The landfill liner shall be laid out as indicated in figure 4.15 above. More details are available in the design reports.

A brief description of the existing physical and environmental status in the order of priority is given in Table 4.2 and Table 4.3. Table 4.2 and Table 4.3 also indicate subprojects requiring resettlement.
Table 4.2: Brief description of the existing physical and environmental status for subprojects in Phase I

<table>
<thead>
<tr>
<th>Priority Number</th>
<th>Description of Sub Project</th>
<th>Length/ unit of Measure</th>
<th>Current Physical Status</th>
<th>Existing Infrastructure</th>
<th>Current Environmental Status</th>
<th>Possible resettlement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CRDB roads</td>
<td>6 km</td>
<td>- Worn out bituminous surface - Services /commercial and residential areas - Heavy traffic - Highly congested - Non-continuous unpaved storm drains</td>
<td>- Telephone and Power lines alongside the road - Sewerage system along the road - Water supply pipes</td>
<td>- Dust emission by vehicle &amp; people movements - Few trees alongside the road - No vegetation on the road surface - Storm drains filled with waste</td>
<td>Building extensions have encroached the road reserve</td>
</tr>
<tr>
<td>2</td>
<td>Majengo - bumiko road</td>
<td>1.9km</td>
<td>- Gravel surface - Non-continuous storm drains - Services /commercial and residential areas</td>
<td>- Telephone and Power lines alongside the road - Water supply pipes on surface</td>
<td>- High dust emission by vehicle movement - Highly eroded - Few trees alongside the road - Storm drains filled with solid waste &amp; stagnant waste water</td>
<td>1 house and three block fences</td>
</tr>
<tr>
<td>3</td>
<td>Col.Ndomba road</td>
<td>1.4km</td>
<td>- Gravel surface - Non-continuous storm drains - Services residential areas</td>
<td>- Telephone and power lines alongside the road - Sewerage system along the road</td>
<td>- Few trees alongside the road - No vegetation on road surface - Dust emission by vehicle movement</td>
<td>Non</td>
</tr>
<tr>
<td>4</td>
<td>Bondeni drain</td>
<td>0.5km</td>
<td>- Not existing - the area around is highly congested &amp; have high traffic - Commercial areas</td>
<td>Non</td>
<td>- No vegetation - Scattered solid waste</td>
<td>Non</td>
</tr>
<tr>
<td>6</td>
<td>Construction of Landfill</td>
<td>24Ha</td>
<td>- Crude and burring dumping, fenced with chain link wire supported by concrete posts</td>
<td>- Telephone and power lines alongside the road - Sewerage system along the road</td>
<td>- Scattered waste around the area - High smoke and dust</td>
<td>Non</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Priority Number</th>
<th>Description of Sub Project</th>
<th>Length/ unit of Measure</th>
<th>Current Physical Status</th>
<th>Existing Infrastructure</th>
<th>Current Environmental Status</th>
<th>Possible resettlement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-Residential houses near the dumpsite</td>
<td></td>
<td>the road</td>
<td>emission</td>
<td>-plastic bags have been washed to River Burka</td>
<td></td>
</tr>
</tbody>
</table>

(UWP Consult, 2009)
### Table 4.3: Brief description of the existing physical and environmental status for subprojects in Phase II

<table>
<thead>
<tr>
<th>Priority Number</th>
<th>Description of Sub Project</th>
<th>Length/Unit of Measure</th>
<th>Current Physical Status</th>
<th>Existing Infrastructure</th>
<th>Current Environmental Status</th>
<th>Possible resettlement</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Njiro-Mbauda Road</td>
<td>6.5km</td>
<td>- Part not existing</td>
<td>- Telephone and power lines alongside the road</td>
<td>- High dust emission by vehicle movement</td>
<td>- 152 properties (including; farms, houses, plots, trees along the road Bloch fences, banana and coffee trees etc)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Services residential areas</td>
<td>- Sewerage system along the road</td>
<td>- Trees alongside the road</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Few trees alongside the road</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- No vegetation on road surface</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Dust emission by vehicle movement</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Relini (Ungaltd) murriet dumpsite</td>
<td>6.0km</td>
<td>- Gravel surface</td>
<td>- Telephone and power lines alongside the road</td>
<td>- High dust emission by vehicle movement</td>
<td>7 houses</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Non-continuous unpaved storm drains</td>
<td>- Culverts</td>
<td>- Few trees alongside the road</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Services/commercial and residential areas</td>
<td></td>
<td>- Storm drains filled with solid waste &amp; stagnant waste water</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- A short non-existing section covered with short grass</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Across River Burka</td>
<td></td>
</tr>
</tbody>
</table>

**Additional** - To be designed in case of availability of other sources or savings

<table>
<thead>
<tr>
<th></th>
<th>Description of Sub Project</th>
<th>Length/Unit of Measure</th>
<th>Current Physical Status</th>
<th>Existing Infrastructure</th>
<th>Current Environmental Status</th>
<th>Possible resettlement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Njiro Road (extension of USRP)</td>
<td>4km</td>
<td>- Gravel/earth surface</td>
<td>Non</td>
<td>- Trees alongside the road</td>
<td>Non</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Services residential areas</td>
<td></td>
<td>- Dust emission by vehicle movement</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Priority Number</th>
<th>Description of Sub Project</th>
<th>Length/unit of Measure</th>
<th>Current Physical Status</th>
<th>Existing Infrastructure</th>
<th>Current Environmental Status</th>
<th>Possible resettlement</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Engira Road</td>
<td>1.2km</td>
<td>-Worn out</td>
<td>-Telephone power lines alongside the road</td>
<td>-Trees alongside the road</td>
<td>Non</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-Services residential areas</td>
<td>-Sewerage system along the Rd.</td>
<td>-Dust emission by vehicle movement</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>St James Road</td>
<td>0.25km</td>
<td>-Gravel/earth surface</td>
<td>-Telephone and Power lines alongside the road</td>
<td>-Trees alongside the road</td>
<td>Non</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-Services residential areas</td>
<td>-Dust emission by vehicle movement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Installation of solar panel traffic signals</td>
<td>2 units</td>
<td>To be installed on bitumen surface road</td>
<td>Non</td>
<td>To be installed at road junction</td>
<td>No vegetation</td>
</tr>
</tbody>
</table>

(UWP Consult, 2009)
4.5.4 People directly affected by the project

The estimated number of project beneficiaries in Arusha is presented below.

Table 4.4: Positively affected persons

<table>
<thead>
<tr>
<th>Name of Road Sub project</th>
<th>Ward</th>
<th>POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>1. Central Business District</td>
<td>Kati</td>
<td>1945</td>
</tr>
<tr>
<td></td>
<td>Ngaranaro</td>
<td>7805</td>
</tr>
<tr>
<td></td>
<td>Kaloleni</td>
<td>5604</td>
</tr>
<tr>
<td></td>
<td>Levolosi</td>
<td>5389</td>
</tr>
<tr>
<td>2. Bumiko</td>
<td>Elerai</td>
<td>20,011</td>
</tr>
<tr>
<td>3. Col. Ndomba</td>
<td>Themni</td>
<td>4259</td>
</tr>
<tr>
<td>4. Engira</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Njiro Mbauda</td>
<td>Lemara</td>
<td>6339</td>
</tr>
<tr>
<td></td>
<td>Sokon I</td>
<td>22,600</td>
</tr>
<tr>
<td>6. Unga Ltd- Muriel</td>
<td>Unga Ltd</td>
<td>9268</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>83220</strong></td>
</tr>
</tbody>
</table>

(UWP Consult, 2009)

Besides the residents who will benefit from the project because of being dwellers of the project area there are about 100,000 people from outside the municipality visiting Arusha during the day and leave in the evening, these also are potential beneficiaries of the project.

(b) Negatively Affected Persons

Negatively affected people are mainly along the priority No. 7, namely the Njiro Mbauda Road. The number of affected people is estimated at 599, 294 being males and 305 females.

The EIA team observed that the Arusha Municipal Council had issued public notices in newspapers and also affixed copies at the council notice boards. It was also observed that the community along the project area were well aware of the proposed projects.

4.6 Other Important Issues

Other factors that were considered in this study are such as presence of historical sites and Indigenous people in the project area as described below. More details of the same can be found in the RAP report for this project.
4.6.1 Presence of Historical Sites

None of the assets to be affected by the proposed works in the preliminary design works were found to have historical or such other cultural or ornamental value to warrant special consideration in the sub project areas in Arusha.

4.6.2 Availability Indigenous Communities

Arusha Region is a host of considerable number of indigenous communities ranging from the Maasai, Barbaiq, Hadzabe etc. During this study no indigenous communities/people were identified within the sub project areas. The RAP affirms that there are no particular individual who could be considered as being member of the above indigenous communities among the affected people. Barbaig and Hadzabe communities are found outside the Arusha Municipality in the districts of Manyara and Mbulu while Maasai are resident in Monduli District. The main occupation of these communities is pastoralist and hunting and it is therefore not expected that they can reside within the vicinity of the project areas.
5.0 STAKEHOLDER CONSULTATIONS AND PUBLIC INVOLVEMENT

5.1 Stakeholders Identification

Simple methods such as networks, literature review and interviews were used in the process of stakeholder identification. From one stakeholder, the team was connected to another and another stakeholder, in a chain like manner. The main stakeholders included Arusha Municipal Authorities, Ward Executive Officers in the project areas, Urban Water Supply and Sewerage Authorities and TANESCO in Arusha Municipality. Other stakeholders were the communities, specifically in Lemara and Sokoni1 wards.

5.2 Public involvement

Public Participation is a process through which different stakeholders influence and share their views regarding development initiatives and the decisions and resources that affect them. The effectiveness of resettlement programs is directly related to the degree of continuing involvement of those affected by a project. Comprehensive planning is required to ensure that local government, NGOs, Project staff and affected men and women interact regularly and purposefully during all stages of the Project.

The overall goal of the consultation process was to disseminate Project information and to incorporate the views of stakeholders in the design of the Environmental and Social mitigation measures, management plan and Monitoring Plan. The specific aims of the consultation process are to:

- Improve Project design and, thereby, minimize conflicts and delays in implementation;
- Facilitate the development of appropriate and acceptable entitlement options;
- Increase long term Project sustainability and ownership;
- Reduce problems of institutional coordination and
- Increase the effectiveness and sustainability of income restoration strategies, and improve coping mechanisms.

An important element in the process of impact assessment is consulting with stakeholders to gather the information needed to complete the assessment. In
the public consultation process three categories of consultation were considered. These were:
- Consultations with the Municipal Council,
- Consultations with Service providers like the Water Authorities and TANESCO, and
- Consultation with the communities living near proposed subprojects

Fundamentally these consultations were intended to disseminate Project information and to collect feedback regarding the Project. It was intended to collect information regarding core urban infrastructure in the municipality, environmental issues and views and perceptions regarding the Project. The minutes of the consultative meetings are attached as one of Annexes of this report.

5.3 Consultative Meetings with Municipal Councils

Consultative meetings at regional, Municipal and local levels included discussions with Municipal heads of departments including Municipal Planners, Land Officers, Surveyors, Water Engineer, Health Officers, Economist, Development officer, etc. These consultations were conducted as either:
- direct, personal interviews with selected informants, or
- focus group discussions with authorities and technical personnel

Typically, the Agenda for these consultations included:
- Presenting the Project:
- Discuss the Status of the core urban Infrastructure in the Municipal;
- Obtaining from the authorities their environmental and socio-economic concerns and perceptions regarding the proposed Investment Subprojects.

5.4 Consultative Meetings with Water Authorities and TANESCO

The meeting was held with AUWASA and TANESCO HQ in Arusha. The method used was direct person to personal interviews with the relevant specialists.

The agenda for these consultations included:
- Presenting the Project by the consultants:

- Information sharing concerning the location of TANESCO or AUWASA infrastructures (i.e. electric poles/lines, water supply pipes and sewerage system) along the project area
- Obtaining from the authorities their environmental and socio-economic concerns and perceptions regarding the proposed Investment Subprojects.

5.5 Community Consultations

Dissemination of Project information among communities living near the proposed investment subprojects is an important aspect of the public participation process and they should be appropriately informed about what is planned. In addition, they, including women and youth, should be involved in a two-way dialogue regarding the Project.

The main objectives of community consultations are to:

- provide clear and accurate information about the Project to the communities along the road;
- inform communities about the Project schedule;
- obtain the main concerns and perceptions of the people and their representatives regarding the project;
- obtain opinions and suggestions directly from the affected communities on their preferred mitigation measures; and
- Identify local leaders with whom further dialogue can be continued in subsequent stages of the Project.

The entire consultation process of the Project was seeking the present, opinions and concerns of women and youth regarding the proposed investment subprojects and involves them in the overall planning of mitigation measures.

The Agenda for the Community consultations included:

- presenting the Project
- defining the local institutional framework and stakeholders;
- obtaining from the local population their environmental and socio-economic concerns and perceptions regarding the proposed project; and

The main concern of the stakeholders along the route included the positive anticipated impacts as well as negative impacts.
5.6 People’s Attitude towards the project

It can be said that the communities are very much interested to see that the Core urban infrastructures are improved. They could realize the benefits of the project in terms of economic and social growth and even improved health status. They appreciated the World Bank (IDA) and Tanzania government efforts to give its priority in improvement of the Municipal Infrastructure. However, the stakeholders consulted are worried about the expropriation of properties and compensation issues.

A summary of issues/concerns raised by different stakeholders is presented in Table 5.1.
Table 5.1: Issues of concern raised during the consultative meetings

<table>
<thead>
<tr>
<th>S/NO</th>
<th>ORGANIZATION/AUTHORITY</th>
<th>ISSUES/ CONCERN</th>
</tr>
</thead>
</table>
| 2.   | AUWASA & TANESCO       | 7. Destabilization and/or destruction of the existing infrastructures such as electric poles, water supply pipes and sewer lines along the project roads.  
8. The Municipal to work hand in hand with AUWASA & TANESCO during the planning and design phases. Funds for moving out these infrastructures should be part and parcel of the budget for subprojects.  
9. Temporal loss of access to water and electricity services for residents in the project area.  
10. Possible environmental pollution by sewage if the sewerage system is destroyed/broken during construction.  
11. Should there be any construction activities near water source/rivers, the contractor should take care not to cause pollution of any kind to the source  
12. Employment opportunity to the local people during the construction period. |
| 3.   | Arusha Municipal Council  
(The municipal planners, environmental engineer, roads engineer, surveyor and the Wards executive officers) | 24. Reduced floods in the Municipality as a result of improvements of road drainage systems, especially in the CBD.  
25. Employment opportunity to the local people during the construction period.  
26. Improved solid waste disposal services will definitely improve the environmental quality and health of people in the municipality.  
27. Improvement to the dumpsite will increase efficiency of the municipal solid waste management service providers in general  
28. Beautification of the municipal.  
29. The status of the municipal will be improved, land and property value will be raised, and new business will open along the roads.  
30. Reduced traffic congestion in the Municipality due to improved road network. Pot holes on the road create congestion because the vehicles have to slow down to avoid driving into the holes.  
31. Possible environmental pollution by sewage if the sewerage system is destroyed/broken during construction “the contractor should clearly state how the flowing sewage will be handled, in order to avoid environmental pollution by sewage”  
32. Temporal loss of access to services such as road, water supply and electricity during |
<table>
<thead>
<tr>
<th>S/NO</th>
<th>ORGANIZATION/AUTHORITY</th>
<th>ISSUES/CONCERN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>construction. “residents will not appreciate prolonged water shortage period”</td>
</tr>
<tr>
<td>33</td>
<td></td>
<td>Reduced floods in the Municipality as a result of improvements to roads drainage systems, especially in the CBD.</td>
</tr>
<tr>
<td>34</td>
<td></td>
<td>Improved solid waste disposal service will definitely improve the environmental quality and health of people in the municipality.</td>
</tr>
<tr>
<td>35</td>
<td></td>
<td>Concerns about the final disposal of collected leachate from the dumpsite. “What will happen to the sludge after collection and treatment in sludge ponds?”</td>
</tr>
<tr>
<td>36</td>
<td></td>
<td>Construction of Bondeni drain will eliminate flooding, especially around the Main market area, and hence reduce the associated nuisance and health risks</td>
</tr>
<tr>
<td>37</td>
<td></td>
<td>The consultant should make sure that the works are well designed and construction works are well supervised to ensure sustainability and to avoid soil erosion. “it has happened in other projects that some parts of the road or the road surface finish is eroded just after the completion of the construction works”</td>
</tr>
<tr>
<td>38</td>
<td></td>
<td>The contractor should leave the working site clean before handing over the work.</td>
</tr>
<tr>
<td>39</td>
<td></td>
<td>The contractor should use the existing borrow pits, stone quarries and sand pits in order to minimise the land degradation at new sites.</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>Tourism and trade sectors will expand due to improvement of the town roads.</td>
</tr>
<tr>
<td>41</td>
<td></td>
<td>Possible population influx into the project areas as a result of improved services. “Population influx is highly associated with spread of communicable diseases (i.e. HIV/AIDS) and competition for the limited resources.</td>
</tr>
<tr>
<td>42</td>
<td></td>
<td>Possible increased road accidents “improved roads - increased vehicle speed- possible increased accidents.”</td>
</tr>
<tr>
<td>43</td>
<td></td>
<td>The municipal should compensate the affected people on time. “The Municipal is compensating the affected people in Njiro - Mbauda road. The affected people are happy with the compensation rates”.</td>
</tr>
<tr>
<td>44</td>
<td></td>
<td>The nature of soil in Arusha is prone to erosion; care must be taken to avoid soil erosion during construction.</td>
</tr>
<tr>
<td>45</td>
<td></td>
<td>Employment opportunities to locals during construction.</td>
</tr>
<tr>
<td>46</td>
<td></td>
<td>The income of the municipality will increase as investors will come after the improvement of the core urban Infrastructures.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S/NO</th>
<th>ORGANIZATION/AUTHORITY</th>
<th>ISSUES/ CONCERN</th>
</tr>
</thead>
</table>
| 5.   | The general community in Sokon1, Sokon1 Engosenglu and Lemara | 1. Beautification of the Municipal “we are happy now that the road will be surfaced with tarmac, there will be no dust blown to our houses and business premises”.  
2. The status of the municipal will be improved, land and property value will be raised, and new business will be opened along the roads.  
3. Reduced traffic congestion in the Municipality due to improved road network. “Improvement to the roads will reduce travel costs, reduced costs for vehicle maintenance (wear and tear) and reduced travel time)”.  
4. Improved solid waste disposal service will definitely improve the environmental quality and health of people in the municipality.  
5. The local people do expect to be employed by the project during the construction phase, and in the operation of the landfill.  
6. Loss of income for people depending on scavenging from the Muriet dumpsite. “Some of the residents near Murriet dumpsite depend entirely on scavenging from the dumpsite. Since after the improvement scavengers will be regulated into the dumpsite, we fear that we might lose our only source of income”.  
7. Temporal loss of access to services such as road, water supply and electricity during construction. “we should be informed in advance if there is any water or electricity cuts during the construction so that we can take necessary precautions”  
8. The contractor should strictly follow the activity time schedule in order to minimize the duration of the effects such as “loss of access to service”  
9. Possible environmental pollution by sewage if the sewerage system is destroyed/broken during construction.  
10. Emphasis on use of standard construction materials and good workmanship  
11. Concerns about the final disposal of collected leachate from the dumpsite. The community near the dumpsite insists on the protection of river Burka, which is one of their water sources.  
12. Construction of Bondeni drain will eliminate flood, especially around the Main market area, and hence reduce the associated nuisance and health risks (such as cholera)  
13. Tourism and trade sectors will expand due to improvement of the town roads.  
14. Possible population influx into the project areas as a result of improved services. “Population influx is highly associated with spread of communicable diseases (i.e. HIV/AIDS) and
15. Possible increased road accidents "the contractor should install road safety signs and speed humps especially near schools to minimise accident risks"

16. Compensation of the affected people is very important "some of us will lose very valuable properties. We would like the municipal to timely compensate us for every property lost".

17. "The public must be made aware of the developments planned at their area in advance". "Affected people must be informed in advance, at least 36 days before the date of demolition".

18. Local leaders at Wards, street/mtaa level should be involved during the process of compensation because they are more familiar with the environment, they know their people, and they can help in identifying exactly what belongs to whom.

19. The Municipal should use the most current rates during compensation.

20. People along Njiro - Mbauda road are happy with the compensation rate offered by the municipal; however, about 30 people have claimed to be left out!

21. The income of the municipality will increase as many investors will come after the improvement of the core urban infrastructures.

22. Dust and noise generation during the construction activities. "the contract should control dust by sprinkling water on the surfaces"

(UWP Consult, 2009)
6.0 IDENTIFICATION AND ASSESSMENT OF IMPACTS

6.1 Impact zones

The study has considered two critical impacts zones, namely;

i. The core impact zone – include the area immediately bordering the project sites.

ii. The zone of influence – which includes the wider geographical areas of Arusha Municipality and the whole region of Arusha.

6.2 Environmental Impact Identification and evaluation

The proposed sub-projects in Arusha Municipality will in principle involve construction/upgrading/rehabilitation of roads and storm drains; and improvement to dumpsite operations. These activities are likely to cause a wide range of impacts on the environmental receptors. The ESIA study aimed at identifying those impacts for the purposes of mitigating the adverse ones or enhancing the project benefits.

Impact identification is a process designed to ensure that all potentially significant impacts are identified and taken into account in the ESIA process. A number of ‘tools’ are available to assist in impact identification. The simplest, and most frequently used, are checklists of impacts, although matrices, network diagrams and map overlays are also commonly used. In this ESIA simple checklists and expert’s knowledge were used. These checklists are the simplest types that provide lists of potential impacts. These are designed to help practitioners to avoid overlooking some of the potential impacts.

The impacts are categorized into direct impacts (short-term or long-term) and indirect impacts. The direct short-term impacts are considered to be those, which will be apparent only during the construction period and such will include mainly construction related impacts. Direct long-term impacts are considered to be those, which will be apparent after construction has been completed (but includes also impacts which may become apparent during the construction phase). The direct long-term impacts, therefore, include those that are construction related and those resulting from the use of the facility in question. Indirect impacts are considered to be those, which may be encouraged or enabled due to the presence of the facilities in question.

The main impacts receptors for the proposed investment sub-projects include physical resources (hydrology, surface water quality, soils, air quality and noise); material assets, public health and safety, aesthetics and landscape.
Simple matrixes presented in Tables 6.1-6.3 have been used to show the interaction between the proposed sub-project activities at different phases and the different environmental receptors. The significance of each impact in the matrix was rated as follows:

- **+3** Very high positive impacts
- **+2** High positive impacts
- **+1** Minor positive impact
- **0** No impacts
- **-1** Minor negative impact
- **-2** High negative impacts
- **-3** Very high negative impacts

The EIA team focused on significant positive and negative impacts that were rated +2, +3, -2, and -3 and later on developed mitigation and enhancement measures.

**Table 6.1: Environmental Impacts Matrix for Cluster I Sub-projects (Roads)**

<table>
<thead>
<tr>
<th>S/N</th>
<th>Environmental parameters/Impacts</th>
<th>Mobilization Phase</th>
<th>Construction Phase</th>
<th>Operation Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Materials extraction and transport</td>
<td>Detour routes</td>
<td>Actual Construction</td>
</tr>
<tr>
<td>1.0</td>
<td>Positive Impacts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Improved transportation systems</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.2</td>
<td>Improved surface drainage along the roads</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.3</td>
<td>Reduction in costs for vehicles maintenance</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.4</td>
<td>Reduction in travel time, reduced travel costs</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.5</td>
<td>Job creation and increased income</td>
<td>0</td>
<td>+1</td>
<td>0</td>
</tr>
<tr>
<td>1.6</td>
<td>Reduced traffic congestion in the Municipality</td>
<td>0</td>
<td>-2</td>
<td>-2</td>
</tr>
<tr>
<td>1.7</td>
<td>Increased property and land values</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.8</td>
<td>Improved community life, services and the municipal status</td>
<td>0</td>
<td>+1</td>
<td>0</td>
</tr>
<tr>
<td>2.0</td>
<td>Negative Impacts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Increased water, soil and air pollution</td>
<td>-1</td>
<td>-3</td>
<td>-2</td>
</tr>
<tr>
<td>2.2</td>
<td>Soil erosion and instability of slopes</td>
<td>0</td>
<td>-3</td>
<td>-2</td>
</tr>
<tr>
<td>2.3</td>
<td>Loss of definite materials and land degradation</td>
<td>0</td>
<td>-3</td>
<td>-2</td>
</tr>
<tr>
<td>2.4</td>
<td>Destabilization and/or destruction of the existing infrastructures along the roads</td>
<td>0</td>
<td>0</td>
<td>-1</td>
</tr>
</tbody>
</table>

### Table: Environmental Parameters/Impacts

<table>
<thead>
<tr>
<th>S/N</th>
<th>Environmental parameters/Impacts</th>
<th>Mobilization Phase</th>
<th>Construction Phase</th>
<th>Operation Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Materials extraction and transport</td>
<td>Detour routes</td>
<td>Actual Construction</td>
</tr>
<tr>
<td>2.5</td>
<td>Population Influx and the related risks</td>
<td>0</td>
<td>-1</td>
<td>-1</td>
</tr>
<tr>
<td>2.6</td>
<td>Increase road accidents and health risks</td>
<td>-1</td>
<td>-2</td>
<td>-2</td>
</tr>
<tr>
<td>2.7</td>
<td>Landscape degradation</td>
<td>0</td>
<td>-3</td>
<td>-2</td>
</tr>
<tr>
<td>2.8</td>
<td>Interference to local hydrology</td>
<td>0</td>
<td>-1</td>
<td>-2</td>
</tr>
<tr>
<td>2.9</td>
<td>Increased noise and vibration</td>
<td>0</td>
<td>-2</td>
<td>-2</td>
</tr>
<tr>
<td>2.10</td>
<td>Loss of natural habitant</td>
<td>0</td>
<td>0</td>
<td>-1</td>
</tr>
<tr>
<td>2.11</td>
<td>Loss of property and resettlement</td>
<td>-1</td>
<td>0</td>
<td>-2</td>
</tr>
<tr>
<td>2.12</td>
<td>Temporal loss of access to services such as water, electricity and passage</td>
<td>-1</td>
<td>-1</td>
<td>-2</td>
</tr>
<tr>
<td>2.13</td>
<td>Relocation of ritual Sites (graves)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2.14</td>
<td>Accidents to construction workers</td>
<td>0</td>
<td>-2</td>
<td>1</td>
</tr>
<tr>
<td>2.15</td>
<td>Interference with traditional norms and values</td>
<td>-1</td>
<td>-1</td>
<td>-2</td>
</tr>
<tr>
<td>2.16</td>
<td>Increased crime rates</td>
<td>0</td>
<td>0</td>
<td>-1</td>
</tr>
</tbody>
</table>

**Key:** Mild Adverse (-1); Adverse (-2); Highly Adverse (-3); Mild Beneficial (+1); Beneficial (+2); Highly Beneficial (+3); No impact (0)

(UWP Consult, 2009)
Table 6.2: Environmental Impacts Matrix for Cluster II Sub-project (Bondeni Drain)

<table>
<thead>
<tr>
<th>S/N</th>
<th>Environmental parameters/Impacts</th>
<th>Activities</th>
<th>Mobilization</th>
<th>Construction Phase</th>
<th>Operation Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Phase</td>
<td>Materials extraction and transport</td>
<td>Actual Construction</td>
</tr>
<tr>
<td>1</td>
<td>Positive Impacts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Elimination of flood in Bondeni area as a result of improved storm drain</td>
<td></td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1.2</td>
<td>Reduced health risks related to water stagnation and floods</td>
<td></td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1.3</td>
<td>Job creation and increased income</td>
<td></td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Negative Impacts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Increased air pollution by dust</td>
<td></td>
<td>-1</td>
<td>-2</td>
<td>-2</td>
</tr>
<tr>
<td>2.2</td>
<td>Loss of definite materials and land degradation</td>
<td></td>
<td>0</td>
<td>-2</td>
<td>-1</td>
</tr>
<tr>
<td>2.3</td>
<td>Destabilization and/or destruction of the existing infrastructures on the site</td>
<td></td>
<td>0</td>
<td>0</td>
<td>-3</td>
</tr>
<tr>
<td>2.4</td>
<td>Population Influx and the related risks</td>
<td></td>
<td>0</td>
<td>-1</td>
<td>-3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S/N</th>
<th>Environmental parameters/Impacts</th>
<th>Mobilization</th>
<th>Construction Phase</th>
<th>Operation Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Phase</td>
<td>Material extraction and transport</td>
<td>Actual Construction</td>
</tr>
<tr>
<td>2.5</td>
<td>Increased noise and vibration</td>
<td>0</td>
<td>-2</td>
<td>-2</td>
</tr>
<tr>
<td>2.6</td>
<td>Temporal loss of access to services such as water, electricity and passage</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
</tr>
<tr>
<td>2.7</td>
<td>Accidents to construction workers</td>
<td>0</td>
<td>-2</td>
<td>-3</td>
</tr>
<tr>
<td>2.8</td>
<td>Interference on traditional norms and values</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
</tr>
</tbody>
</table>

**Key:** Mild Adverse (-1); Adverse (-2); Highly Adverse (-3); Mild Beneficial (+1); Beneficial (+2); Highly Beneficial (+3); No impact (0) (UWP Consult, 2009)

### Table 6.3: Environmental Impacts Matrix for Cluster III Sub-project (Landfill)

<table>
<thead>
<tr>
<th>S/N</th>
<th>Environmental parameters/Impacts</th>
<th>Mobilization Phase</th>
<th>Construction Phase and Actual Construction</th>
<th>Operation Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Facilities usage</td>
<td></td>
<td>Facility Maintenance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td><strong>Positive Impacts</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Improvement to municipal solid waste management (proper disposal)</td>
<td>0</td>
<td>0</td>
<td>+1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+1</td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>Reduction of health risks related to unsanitary waste disposal</td>
<td>0</td>
<td>0</td>
<td>+1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+1</td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>Job creation and increased income (for construction workers and landfill operators)</td>
<td>0</td>
<td>+1</td>
<td>+3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+3</td>
<td></td>
</tr>
<tr>
<td>1.4</td>
<td>Improved status of the Municipal due to the presence of the landfill</td>
<td>0</td>
<td>0</td>
<td>-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td><strong>Negative Impacts</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Possible accelerated water, soil and air pollution</td>
<td>-1</td>
<td>-3</td>
<td>-2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-2</td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>Soil erosion in the dumpsite</td>
<td>0</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>2.3</td>
<td>Loss of definite materials and land degradation</td>
<td>0</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>2.4</td>
<td>Population influx into the area and the related risks</td>
<td>0</td>
<td>-1</td>
<td>-3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-3</td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>Increase road accidents and health risks</td>
<td>-1</td>
<td>-2</td>
<td>-3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-3</td>
<td></td>
</tr>
<tr>
<td>2.6</td>
<td>Landscape degradation</td>
<td>0</td>
<td>-3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-3</td>
<td></td>
</tr>
<tr>
<td>2.7</td>
<td>Interference to local hydrology</td>
<td>0</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S/N</th>
<th>Environmental parameters/Impacts</th>
<th>Mobilization Phase</th>
<th>Construction Phase</th>
<th>Operation Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Materials</td>
<td></td>
<td>Facility usage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>extraction</td>
<td>and Actual</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>transport</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>2.8</td>
<td>Increased noise and vibration</td>
<td>0</td>
<td>-2</td>
<td>-2</td>
</tr>
<tr>
<td>2.9</td>
<td>Loss of natural habitant</td>
<td>0</td>
<td>0</td>
<td>-3</td>
</tr>
<tr>
<td>2.10</td>
<td>Loss of income for existing scavengers</td>
<td>0</td>
<td>0</td>
<td>-2</td>
</tr>
<tr>
<td>2.11</td>
<td>Ground water pollution due to leachate</td>
<td>0</td>
<td>0</td>
<td>+3</td>
</tr>
<tr>
<td>2.12</td>
<td>Increased risk of open and subsurface fire</td>
<td>0</td>
<td>0</td>
<td>+3</td>
</tr>
<tr>
<td>2.13</td>
<td>Public health problems due to pests and birds</td>
<td>0</td>
<td>0</td>
<td>+3</td>
</tr>
<tr>
<td>2.14</td>
<td>Occupational Health effects</td>
<td>0</td>
<td>0</td>
<td>+2</td>
</tr>
</tbody>
</table>

*Key: Mild Adverse (-1); Adverse (-2); Highly Adverse (-3); Mild Beneficial (+1); Beneficial (+2); Highly Beneficial (+3); No impact (0)*

(UWP Consult, 2009)
6.3 Cluster I & II Sub-projects - Short-Term Impacts: Construction Phase

Direct Positive

6.3.1 Job creation and increased income to local communities

The investment sub-projects in Arusha Municipality are aimed at improving the basic urban infrastructure and services and capacity building for the municipal. Improvement to the road and the construction of Bondeni drain are expected to open more opportunities for tourism and business in the municipality. Enhanced trade and tourism will create self-employment income generating activities and hence enhance the general well-being of families. A family with sufficient and regular income is more likely to afford paying the costs of education and health services for its members apart from getting enough food to eat.

It is expected that most of the inexpert labour and some skilled workforce will be hired from within the Municipality. It is also expected that the utilization of local inexpert labour will somehow cause a diffusion of knowledge from the skilled workers and hence open the door to the possibility of acquiring employment elsewhere.

In addition, the local people will be selling food and other merchandise to the construction workforce and hence raise their economic status. Also, to some extent the improved service is expected to stimulate creation of self employment activities for unemployed women which will make them economically powerful to get away from commercial sex work and reduce the spread of HIV/AIDS.

Direct Negative impacts

6.3.2 Increased water and soil pollution

The construction and rehabilitation activities might result into small-scale and short-term environmental pollution. For example, there is a likelihood of water pollution to occur at rivers crossings and during construction of off-road drainage structures. Impacts can also result from accidental spillage of fuels and construction materials, which may pollute both water and soil. Culvert construction may stir riverbed deposits into suspension. Though the large particles may settle quickly, the finer ones will increase the turbidity of
surface water sources. The turbidity impacts may be short-term since the stream construction takes place within a few weeks.

Roads surface drainage and the Bondeni drainage system will drain concentrated run-offs from the roads. Storm water from tarmac roads is known to contain high concentrations of oils, heavy metals, particulate matter, etc. Water and soil pollution by accidental spillage of fuel or other materials and chemicals associated with the construction works is an undesirable possibility. Obviously, it is not possible to predict the location or type of spillage but it is considered that any spillage to soil will be local in nature and remediation should not be difficult. Spillage to watercourse is potentially very damaging causing impacts on humans, fishes, riverine vegetation and wild animals.

6.3.3 Soil erosion and instability of slopes

Construction works would accelerate erosion problems in most cut sections. Nevertheless, all cuts in the sloping grounds should be refurbished firmly and provided with the vegetation cover to reduce the effect of soil erosion.

6.3.4 Noise, vibration and air pollution during construction phase

Construction activities such as excavation works, movement of vehicles, stock piling of materials, operation of crusher and asphalt plants, and general earth works at the sites will produce a lot of dust. Exhaust fumes will mainly come from construction plants, machinery and vehicles in operation. Fumes will also come from the processing of asphalt and other similar materials. Dust and fumes will have major direct but short-term impacts during the project construction phase.

Bondenin drain and all roads in this project are located within commercial – residential areas. Uncontrolled dust, noise and vibration will be a great nuisance to people. However, selection of proper construction machines and air dispersion and dilution are expected to lessen the air pollution problem. Moreover, sprinkling of the working sites with water during construction work will further lessen generation of dust, and consequently alleviate the air pollution problem.

Noise and vibration will be produced by construction vehicles, plant and machinery during delivery of materials, processing of materials, and actual construction work. Due to an increase in activities and number of operational vehicles, the impacts of noise and vibration will cause disturbance to humans especially because the sites are within commercial –
residential areas. Vibration may even cause physical damage to properties near the construction sites. Paved surfaces especially in the CBD may propagate vibrations even far away from the construction site.

Dust will be a temporary nuisance to the people within the core impact area especially during construction in the dry season.

6.3.5 Destabilization and/or destruction of existing infrastructures/facilities along the roads

Existing infrastructures such as electricity, telephone, water supply and sewerage system facilities in some of the project sites will be disturbed by either weakening and/or total destruction of the facilities. This may further disrupt the normal activities of the communities and interrupt delivery of health and other important social and economic services. Broken sewerage pipes may cause water pollution, nuisance and health problems to the surrounding communities. Interruption of water supply will cause people to opt for sources with compromised quality thus jeopardising their health. This kind of temporal interruptions are likely to occur to users in the core impact zone, as well as in the zone of influence.

Figure 6.1: Sewer inspection chamber and electric lines along the road in Arusha
(UWP Consult, 2009)

Again it is likely that there will be temporal displacement of facilities during the upgrading/construction of the roads. A certain level of disruption to economic activities will be experienced by mobile vendors along the roads.
These vendors are not registered with the municipal and their number is not known. Their operations are highly informal and therefore not eligible for compensation.

6.3.6 Population Influx

Construction of the facilities will attract more people in the area due to availability of employment opportunities as well as opportunities for other income generating activities. Construction of the roads will particularly increase accessibility to, and through the areas. These may, as a result lead into an increase in diseases, especially sexually transmitted ones, such as HIV and AIDS.

The population influx into the areas would also increase pressure on both resources and social services due to increased demand on the services and resources. This may lead to scramble for resources which might cause conflicts in the community.

6.3.7 Interference on Traditional Norms and Values

Job seekers will come with new ideas that will diffuse in the community altering the style of living, thinking consequently norms and values of the indigenous people will be weakened. This might end up introducing new tradition norms and values, and as a result cause moral decays like new ways of dressing, increased cases of rape, children neglects, etc.

6.3.8 Loss of property/land take and possible resettlement

A few commercial and/or residential houses will face demolition of part of the house verandas extended into the road reserve areas. For business centres the extended verandas are used for displaying goods. The loss of business premises will affect both the owner and the employees as the owner will lose income while the employees will lose employment and consequently income.

About 165 properties in Njiro - Mbauda -152 properties (including; farms, houses, plots, trees along the road Bloch fences, banana and coffee trees etc) in Arusha Municipality will be affected by road construction. Others include one (1) house and three (3) block fences along the Mjengo-Bumiko road and seven (7) more houses along the Relini Unga limited – Muriet road. The Njiro – Mbauda Road, and the Relini- Unga limited – Muriet dumpsite are in Phase in projects, and therefore their Impacts will be felt during the implementation of Phase II projects.
A few commercial and/or residential houses will face demolition of part of the house verandas extended into the road reserve areas. For business centres, the extended verandas are used for displaying goods. The loss of business premises will affect both the owner and the employees as the owner will lose income while the employees will lose employment and consequently income. About 165 properties in Njiro - Mbauda -152 properties (including; farms, houses, plots, trees along the road, Bloch fences, banana and coffee trees, etc) in Arusha Municipality will be affected by road construction. Others include one (1) house and three (3) block fences along the Majengo-Bumiko road and seven (7) more houses along the Unga limited – Muriet road.

According to the municipal officials, the owner of each property shall be compensated. The compensation rate for the properties shall depend on its value and agreements between the owners and the authority.

**Figure 6.2**: Land to be lost for Njiro – Mbauda road in Arusha (UWP Consult, 2009)

### 6.3.9 Safety and health risks

Excavation and construction works exposes the labourers and the general public to air borne diseases such as bronchial and other respiratory tract diseases. Also lack of protective gears or poor use of the same during constructions might result into loss of lives or injuries. The incidence rate of water borne diseases such as cholera and diarrhoea will increase if there will be no proper sanitation practices at the camps used by the labourers.
At the same time, the road construction will increase traffic congestion and accelerate road accidents both for the road users and the construction team.

6.3.10 Loss of access to services

Construction activities might cause temporary loss of access to services such as water, electricity and right of passage. For example water supply might be cut in order to remove the supply system from the road before replacing them after completion of construction works. Another example is a case where people will not be able to use roads during construction. They might be forced to use other longer or unsafe routes to reach their destination. Children especially will be disturbed if they could not find help from adults. These effects can be minimised if the construction works are timely, and run by phases.

6.4 Cluster I & II Sub-projects - Long-Term Impacts: Operation Phase

Positive Impacts

6.4.1 Improved Transportation Services

The road networks will facilitate easy transportation within Arusha Municipality. The selection of the road priorities was such that the improved road will reduce congestion in the CBD by provisional of alternative route to a destination without going through the CBD unnecessarily. An example of such roads includes the Majengo- Bumiko and Njiro – Mbauda Roads. Transportation of waste from the town to the dumpsite will be enhanced by the construction of Unga Limited – Muriet road. Traffic congestion caused by rough roads will be eliminated. The travel or haul time will be shortened, travel will be comfortable, and transportation costs will be fair. Improved roads and drainage system will also attract small scale business people and food vendors. The benefits to be brought in by these facilities will be felt both at the core impact zone and at the zone of influence.

6.4.2 Improved Storm Water Collection Systems

The construction of Bondeni drain and surface drains along the roads will efficient flood collecting in the area. During the rain season Bondeni area becomes flooded, leading into material and property damage; as well as destruction of water supply and sewerage system. The destruction of water supply systems which leads to water shortages, coupled by the destruction of
sewerage system which causes a big deal of water and the general environmental pollution have been among the major causative of water borne diseases in the area. Stagnant water becomes a proper breeding site for disease vectors such as mosquito which spreads malaria, one of the most lives threatening disease in Tanzania.

Therefore, the improved collection of storm water would avoid property damage and safeguard the public health in long term basis, and the effects would probably be felt even at the zone of influence.

6.4.3 Job creation and increased income to local communities

There would also likely be employment availability during the operation phase pertaining to maintenance of the above said facilities. These would include grass cutting, cleaning drainage culverts, etc; as well as some clerical / low level supervision jobs. Such employment would contribute to poverty reduction, especially for women.

6.4.4 Improved community life, services and status

In general the community life, services would be improved to a great extent by the provision of these services. The current status of the project areas will be improved and beautified. These collective benefits will be for long term and might attract business and tourism to the areas. Such improvements would benefit the nation as a whole.

6.4.5 Increased property and land value

Road improvement shall increase the value and status of the area. House rents/ values as well as land values usually goes up when the area around is upgraded. This effects will be for long term and very beneficial to property owners. On the other hand, the tenants will see such improvements as a negative impact, mainly because of the increased rents. All in all, the increased property value is seen to be of more beneficial to the general community.

Negative Long-Term Impacts

6.4.6 Landscape modification

The landscape modification will be associated with land take (where
necessary) for road widening and cut and fill sections to improve both horizontal and vertical alignment. These are permanent features as it is highly improbable that any land taken or earthworks constructed for the project will ever be returned or reinstated.

### 6.4.7 Interference to local hydrology

The construction of roads might result into change in drainage patterns of the site. Paving the road surface and provision of drainage systems will limit water infiltration into the surface. Interference to local hydrology may have some benefits such as flood reduction along the road surface, but may also affects water resources and the ecosystem. Effects to water resources might lead to water shortages in the area especially during dry seasons. Other negative hydrologic and drainage impacts are not foreseen. Another main impact associated with the provision of road drainage channels is the blocking of shortcut access paths to residences for houses located along the road.

### 6.4.8 Increase in road accidents

Presence new roads would increase traffic and traffic speed which in turn would result into unreasonable road accidents people especially school children and old people. The main causes for accidents, reckless driving, defective vehicles, drunkenness, poor road facilities for the pedestrian and cyclists and unqualified drivers.

### 6.4.9 Increased noise, vibration and air pollution at operation phase

Pollution will be evident during the operation phase of facilities due to factors such as fuels and other chemical spillage, exhaust emissions from vehicles, noise and vibration from vehicles.

Noise is one of the most obvious negative impacts of daily road use. The discomfort caused by noise includes auditory fatigue and temporary lessening of hearing ability. However, perceived noise is related to background noise level, so that a new facility in quiet areas or noisy trucks at night are often perceived as worse than higher levels of noise in a busy area during the work day.

However, the magnitude of the pollution is considered to be very low. The effects of exhaust emissions on air quality is considered to be significant if no maintenance program will be installed. Under good maintenance schedule, traffic exhaust emissions, will be intermittent and atmospheric dispersal of exhaust emissions will maintain the air quality. However, concerted effort to
check engine performance is needed so as to deter vehicles not road-worth from using the road.

6.4.10 Loss of definite materials and land degradation

Construction of the roads and Bondeni drain will have direct impacts related to excavation; quarrying and deposition of spoil material. Significant volumes of earthworks fill; road gravel and rocks will be extracted during project execution. For example; since the road will be constructed to bitumen standard, then, significant use of definite materials is expected.

Quarrying involves clearing the vegetation at the sites, excavation and transportation of the material. Thus, borrowing and quarrying activities will cause habitat change, land degradation (due to removal of fertile top soil), landscape impairment (visual intrusion) and soil erosion-which lead to siltation of waterways. Quarrying, excavation and the disposal of spoil material can destroy the economic and aesthetic value of public and/or private property including land. Some species may be affected during construction, but not to the level of extinction. However, establishment of detour routes specifically during construction of roads may damage some species.

Scenic quality deterioration will occur due to stock piling of construction materials and discoloration of plant leaves and houses in the vicinity of the facilities due to wind-blown dust. Excavation work as well as presence of construction vehicles, plant and equipment will also add to scenic quality deterioration. Scenic quality deterioration will also occur off-site, at the sources of construction materials, the quarries and sand mines. If these are not made good they may become an eyesore. Scenic quality deterioration can destroy the economic and aesthetic value of public and/or private property including land. Scenic quality degradation effects will be significant, short term and direct. They will, in spite of everything, be manageable given proper site operation and prior warning as well as issuance of site operation guidelines. Abandoned borrow pits have damaging effects (as experienced in other parts of Tanzania). Borrow pits and quarry sites provide good environments for disease vectors and thus posing serious public health hazards. Abandoned pits filled with water harbour disease vectors responsible for transmission of malaria and schistosomiasis.
6.4.11 Loss of natural habitats and trees

Minimal vegetation clearance is expected mainly to obtain the 6-8 m carriage way and 45 m-road reserve. This might involve uprooting trees and vegetations which falls within the right of way as well as displacing huge masses of topsoil. Detours to provide access to traffic during construction phase will further cause loss of habitat.

The CBD roads have fairly sufficient width though in some cases the width will need to be widened, the carriage way generally will need widening and this will entail considerable vegetation loss, including planted trees and natural trees along the existing roads.

6.4.12 Increased immigration

Improved service is usually accompanied by in-migration of job seekers and opportunistic businesses and speculators as well as expansion of agricultural areas. Considering the current HIV-AIDS level in Tanzania, increased population in villages due to immigration may result into increased HIV-AIDS victims.

6.4.13 Increased Crime

Improve road is more likely to attract more advanced criminal activities in the project areas as escapes by road will be more faster in the project areas. The life of residents will be more in danger than now. Advanced weapons are more likely to increase. Influx of job seekers of all ages and subsequent crime poses a threat to security in the project area.

6.5 Cluster III Sub-projects - Short-Term Impacts: Construction Phase

Direct Positive

6.5.1 Job creation and increased income to local communities

At least 15 locals and a few more skilled labours will be recruited during the construction of the Dumpsite in Murriet. The labours will be involved in the construction of the landfill facility such as the cells, installation of leachate and gas collection facilities and the construction of leachate treatment ponds among other facilities. The landfill technology is quite new in Tanzania, and
the workers will get a chance to learn it. It is hoped that the knowledge acquired during the construction will open doors to the possibility of acquiring employment elsewhere. This will improve the well being of the local indirectly, and its effects can even be of long term after construction.

**Direct Negative impacts**

### 6.5.2 Increased water and soil pollution

The construction of the landfill will involved hauling of construction materials, diversion of the local drainage from the site, collection and pilling of scattered waste on the site, excavation of cells etc. These activities are likely to cause suspension of dust in the air, and later on deposition of the same on water of soil. For example River Burka, which is hardly 1 km from the site, might be polluted by dust deposition and surface runoff from the site. Impacts can also result from accidental spillage of fuels and construction materials, which may pollute both water and soil. Dust deposition on the water will increase the water turbidity. The turbidity impacts may be short-term since the stream construction takes place within a few weeks.

Water and soil pollution by accidental spillage of fuel or other materials and chemicals associated with the construction works is an undesirable possibility. Obviously, it is not possible to predict the location or type of spillage but it is considered that any spillage to soil will be local in nature and remediation should not be difficult. Spillage to watercourse is potentially very damaging causing impacts on humans, fishes, riverine vegetation and wild animals.

### 6.5.3 Noise, vibration and air pollution during construction phase

Construction activities such as excavation works, movement of vehicles, stock piling of materials, and operation of equipments at the landfill area will produce a lot of dust. Exhaust fumes will mainly come from construction plants, machinery and vehicles in operation. Fumes will also come from the construction equipments. Dust and fumes will have major direct but short-term impacts during the project construction phase. Water sprinkling on the surface of the working sites during construction work will further lessen generation of dust, and consequently alleviate the air pollution problem.

Noise and vibration will be produced by construction vehicles, plant and machinery during delivery of materials, processing of materials, and actual
construction work. The vegetation and loose soil along the site have the potential for damping noise and vibration. As such, noise and vibration impacts will have short range – near the construction site. Dust will be a temporary nuisance to the people within the core impact area.

6.5.4 Population Influx

Construction of the facilities will attract more people in the area due to availability of employment opportunities as well as opportunities for other income generating activities. Interaction of people from different parts on the municipality is likely to result into an increase in diseases, especially sexually transmitted ones, such as HIV and AIDS. The population influx into the areas would also increase pressure on both resources and social services due to increased demand on the services and resources. This may lead scramble for resources which might cause conflicts in the community.

6.5.5 Interference on Traditional Norms and Values

Job seekers will come with new ideas that will diffuse in the community altering the style of living, thinking consequently norms and values of the indigenous people will be weakened. This might end up introducing new tradition norms and values, and as a result cause moral decays like new ways of dressing, increased cases of rape, children neglects etc. It was however noted that more that 50% the residents around the dump are not locals, and therefore the question as to whether mixed traditions will affect the traditions is debatable.

6.5.6 Safety and health risks

Excavation and construction works inside the dumpsite will exposes the labourers and the general public to air borne diseases such as bronchial and other respiratory tract diseases. Also lack of protective gears of poor use of the same during constructions might result into loss of lives or injuries. The incidence rate of water borne diseases such as cholera and diarrhoea will increase if there will be no proper sanitation practices at the camps used by the labourers.
6.6 Cluster III Sub-projects - Long-Term Impacts: Operation Phase

Positive Impacts

6.6.1 Improved solid waste disposal facility

Improvement to the Muriet dumpsite will enable safe disposal of solid waste from Arusha municipality. The benefit of this improvement would include; protection of soil, surface and ground water well as air around the dumpsite. Currently there is remarkable environmental pollution caused by crude waste dumping at the dump site. The improvement to the dump site will allow engineered sanitary disposal of waste and hence eliminate the emission of dust, smoke and odour to the surrounding environment, leachate will be collected and treated and hence eliminate the possible ground and surface water pollution (i.e. pollution of river Burka, which is near the dump site). These in turn will protect the ecosystems depending on water from river Burka and improve community health.

Furthermore, there other related advantages that will accrue from the project, for example; there will also be economical benefits such as employment opportunity, where as skilled and unskilled labourers will be employed to run the dump site on daily basis. There will also be indirect self employment, such as food vendor, waste separation and recycling etc. The impacts of the dumpsite operations will be long term and will be felt both at the core impact zone and at the zone of influence.

6.6.2 Job creation and increased income to local communities

During the operation phase of the dumpsite, a few people will be employed and trained to operate the landfill. These are such as security guards (at least 2), receptionists (at least 2), waste handling team (at least 6). A limited number of scavengers will also be allowed into the landfill. Such employment would contribute to poverty reduction, especially for women.

6.6.3 Improved community health, services and status

Improper disposal of waste is directly related to eruption of diseases such as cholera, diarrhea dysentery, and malaria. It is clear that the hygienic conditions of Arusha Municipal will significantly be improved. The project will also minimize pollution of River Burka by leachate, surface runoffs, which caries a lot of plastic bags into the river.
On the other hand, the status of the Municipal will improve. The municipal will become the first one in Tanzania to have a landfill, maybe a learning example for other municipalities in future.
Negative Long-Term Impacts

6.6.4 Interference to local hydrology

Construction of the landfill will not entail significant interference with the hydrologic and drainage aspects of the area. The local hydrology will have to be routed away for the whole project life. Run-off channels will be constructed to safely carry the uncontaminated runoff to River Burka.

On the other hand sources of construction materials will create pits in which water would accumulate. These can be breeding sites for mosquitoes and can serve as a means of harvesting rainwater as well. The latter possibility can help to alleviate water shortages in the area especially during dry seasons. Other negative hydrologic and drainage impacts are not foreseen.

6.6.5 Increased immigration

Improved service is usually accompanied by in-migration of job seekers and opportunistic businesses and speculators as well as expansion of agricultural areas. Considering the current HIV-AIDS level in Tanzania, increased population in villages due to immigration may result into increased HIV-AIDS victims.

6.6.6 Risk of ground water pollution by leachate

Pollution of soil and ground water by leachate is among the major problems associated with management of landfills. Depending on the chemical nature of waste filled in a landfill, the generated leachate can contain a variety of contaminants, including toxic chemicals, heavy metals, chlorinated compounds, halogenated hydrocarbons etc. Wastes from industries have been reported to produce more toxic leachate than municipal wastes. The Murriet dumpsite will be used for disposal of both Industrial and Municipal wastes, and is therefore expected to generated leachate consisting of a mixture of hazardous and non hazardous compounds. The leachate could also contain recaltrat compounds, as well as volatile organic compounds. However, the chemical composition of leachate is influenced by a number of factors, including the age of the fill, type of waste stored, operational practices at the site and percolation rate through the fill to the groundwater and other environmental conditions, such as whether etc.
6.6.7 Risks of explosions and fire hazards

Open and subsurface fires are more likely to happen during operation phase of the landfill. These fires may be due to: Methane produced from anaerobic conditions of the subsurface environment, Scavengers activities eg smoking or cooking, and wastes from combustion activities, which is not completely extinguished. These fires can pose a serious danger to environment (air pollution) and human health.

6.6.8 Threats to public health and workers safety

Improper operation of the landfill could lead to creating of breaking site for disease vectors. It could also lead spread of waste by birds, rats and pets to the nearby community which is only 100 m from the dump. This could result into outbreak of disease. For example, flies and other rodents can carry bacteria from the dump to homes, and cause eruption of diseases such as diarrhoea and dysentery. Stagnant water in the landfill will favour generation of mosquitoes, vectors malaria parasite.

Rats and other rodents spread diseases such as rabies, rat-bite fever, typhus, plague etc. Rodents are brought in to site in loads of wastes or migrate from surrounding areas. They remain in the facility if there is food, shelter and water. Scavenger birds can also play a big role in spreading uncovered wastes. Scavenger birds can create nuisance and unsanitary conditions to the community near waste dumps.

Unsanitary conditions in an improperly managed dump could cause significant health threats to the dump workers. The exposure route could be though dermal contact, ingestion (with water or food) or through inhalation, after contaminants increase into the air. Apart from health risks, workers will also be faced with accident risks from the plant equipments and vehicles.
7.0 IMPACTS MITIGATION MEASURES

7.1 General considerations

This section is devoted to describing measures or actions that shall be implemented so as to minimize any of the potential impacts identified earlier. Many of the mitigation measures put forward are nothing more than good engineering practice that shall be adhered to during the design and construction phases for individual Clusters.

7.2 Cluster I Sub-projects: Mitigation measures for Direct Short-Term impacts

7.2.1 Increased water and soil pollution

- Spillage of fuels and chemicals is a risk, but spillages are likely to be local and remediation is considered easy.

- Spillage to watercourse is harmful to all living beings. In case of accidental spillage, the contractor shall exercise every effort in order to minimize the associated risks. For instance refuelling of plant or transfer of materials should not be carried out near watercourses, and any local spillage to soil should immediately be remedied.

- Good house-keeping shall be practiced within material storage compounds or vehicle maintenance yards where the possibility of spillage is great.

7.2.2 Soil erosion and instability of slopes

- Unnecessary ground clearance and sensitive re-alignments shall be avoided.

- Lined drainage channels at sensitive terrains shall be provided to control speed and volumes of storm-water. The discharge points must be carefully chosen to avoid erosion of arable land and creation of gullies.
7.2.3 Noise, vibration and air pollution

- The nuisance of noise, vibration and dust will be transient and good work practice can minimize them. In addition, most of these impacts are already being experienced due to the existing old road.

- The impacts of noise and dust emissions will further be minimized by proper choice of plant and machinery (i.e. fitted with noise and dust silencers or reducers) and locating quarry areas away from human habitations (at least 500 m away).

- Dust at work places within or close to human habitation should be critically minimized by periodic water sprinkling on working sections. The contractor shall advise or notify local households on dust, noise, vibration and other dangers.

7.2.4 Destabilization and/or destruction of existing infrastructures along the roads

Arusha municipal council and the contractor to work in collaboration with the service providers (i.e. TANESCO, TTCL and AUWSA in Arusha) from the project planning stage, so as to reduce adverse impacts that would occur as a result of shifting the service lines from the road, during the roads construction.

A working plan should be prepared to avoid water or sewage overflowing on the surface and also make sure that the period for service cuts are as short as possible, and that they are according to a pre prepared schedule, that is known by the service users, in order to minimize disturbance to the users as save the costs that would have been incurred if the lines were to be destroyed by the project activities.

7.2.5 Increased Road Accidents

The contractor will ensure that the traffic flow is not interfered during the whole construction period. No total closure of the road will be allowed. The contractor shall provide diversions and deploy a person responsible for traffic safety.
7.2.6 Safety and health risks

- Appropriate working gear (such as nose, ear mask and clothing) and good camp management shall be provided. During construction the contractors shall ensure that the campsites are fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, fire fighting and clean and safe water supply. The contractor may be required to drill a borehole for obtaining water for construction.

- A well-stocked First Aid kit (administered by medical personnel) shall be maintained at each camp. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing some health education to the workforce.

7.2.7 Temporal Loss of access to services

- The Municipal to involve the affected service providers in the designing and construction phase.
- The general public and the service providers to be notified in advance, so that they can be well prepared during the period on service cut.
- Roads signals and diversions to be created where the road has been closed. The signals to be in both language and use simple signs that could be understood even by school children.
- The budget for (or part of) re-installing the service to be included in the project costs.

7.2.8 Increased spread of HIV/AIDS

- Since construction camps will attract many job seekers and trade mongers, the contractor shall enforce a code of conduct in the camp to encourage respect for the local community and to maintain cleanliness of the camp at all times.
- The contractor shall deploy locally available labour to reduce risk of spreading of communicable diseases (especially STD).
- A safety, health and environment induction course shall be conducted to all workers, putting more emphasis on HIV/AIDS, which has become a national disaster.
- In order to prevent more HIV/AIDS infection, during the implementation phase, the project should include information education and communication component (IEC) in its budget. This will help to raise more awareness on HIV/AIDS, and means to suppress its incidence.
7.3 Cluster I Sub-projects: Mitigation measures for Direct Long-Term Impacts

7.3.1 Landscape degradation

- Wherever possible mature trees along the roads shall be retained. Afterwards trees planting campaign will be necessary to restore the original environment of the area. Also, any cleared plant material and topsoil shall be stockpiled so as to assist in replanting scheme.
- The harvested timber shall be given to local communities (through local government) for use.
- Cut and fills sections shall be designed so as to minimize net materials import. Appropriate work method employed will minimize material import.
- Borrow pits and quarries will be reinstated and blended to fit the surrounding landscape environment.
- Contract documents shall specify the disposal of spoil material not used for embankment.

7.3.2 Interference to local hydrology

- Construction of the roads interferes with the natural surface and groundwater flow regimes. Good design features shall be adopted to ensure that the changes of the hydrological regimes are minimized and that any impacts are insignificant.
- The design will provide controlled and effective storm water dispersion by installation of adequate and appropriate drainage structures. The discharges points shall be well designed to avoid accelerate erosion downstream.

7.3.3 Safety to road users during the operation phase

- For roads, the design shall take account of safety concerns especially at human habitation crossings e.g. installation of bus stops along the road stretch at settlement centres.
- Awareness seminars shall be conducted during the construction and operation phases of the roads
- Traffic management plan shall be incorporated in the designs to include for example details of roads signs, markings, intersection layouts, access restrictions, bus stops, crossings, footpaths etc.
- The traffic management plans shall be presented both in English and Swahili.
7.3.4 Increased noise, vibration and air pollution during the operation phase

- The design of the facilities shall take into account measures to reduce noise and air pollution. For example, steep grades at critical locations shall be avoided so as to reduce noise from acceleration, braking and gear changes.
- Road signs such as speed limit signs shall be installed, and also exhaust emissions controls shall be enforced, especially in the CBD where air dilution is minimal.
- Operation machine and equipments shall be those with lowest possible noise and emissions levels.

7.3.5 Loss of definite materials and land degradation

- Where construction materials such as gravel and stones are to be obtained from village lands or municipal councils, the material shall be purchased and this will be officially negotiated with villager/municipal authorities in order to avoid conflicts. The contractor may be compelled to pay a small fee to the authority in question.
- Potential long term environmental impacts of borrow pits and quarry sites relate to the way they are left once the resource has been extracted. In this case, all borrow pits and quarries shall be rehabilitated and proper landscaping done after completion of the construction. Pits shall not be left with steep or vertical sides.
- The topsoil (except for the dumpsite area) shall be stock piled for later use in reinstating the pit. Shallow slopes will encourage rapid re-vegetation thus preventing erosion as well as providing safety to animals.
- The significance to the region of the depletion of the material assets is not considered to be high as deposits throughout the remainder of the region will not be significantly affected by this project and they remain available for other projects.
- Obtaining sand from valleys and riversides must be well investigated to avoid accelerated land degradation and pollution of water sources and/or interfere with agricultural activities in farmland.
7.3.6 Increased Crime

- The police post must be constructed in strategic areas particularly near the bus stand. Community policing should be established to support insufficient police force. Community should be encouraged to participate in security matters by providing information on any suspects. The cooperation of local people together with the *sungusungu* will help to lessen criminal incidents and maintain security of people and their properties.

7.3.7 Interference to traditional norms and values

- Diffusion of cultural moral values and customs from one community to another is an inevitable especially where more than one cultural background is in contact to each other, maintenance of local ties becomes very difficult. Though the issue is very difficult to control, the communities shall be encouraged to stick to their traditions and copy only valuable traditions norms from the new comers.

7.3.8 Increased road accidents

- Installation of proper road signs and regular inspections for their presence
- Installation of speed control devices like humps
- Training of drivers and pedestrians
- Installation of pedestrian lanes at human settlement crossings

7.3.9 Land expropriation, loss of property and resettlement

The impacts of land expropriation, loss of property and resettlement can be mitigated by the development and implementation of the resettlement action plan (RAP), consistent with OP 4.12. see the RAP that has been prepared as a separate document from this ESIA.
7.4 Cluster II Sub-project: Mitigation measures for Direct Short-Term impacts

7.4.1 Noise, vibration and air pollution

- The nuisance of noise, vibration and dust will be transient and good work practice can minimize them. In addition, most of these impacts are already being experienced due to the existing old road.
- The impacts of noise and dust emissions will further be minimized by proper choice of plant and machinery (i.e. fitted with noise and dust silencers or reducers) and locating quarry areas away from human habitations (at least 500 m away).
- The drain site is in a commercial area. Dust shall be critically minimized by periodic water sprinkling on working sections. The contractor shall advise or notify the owners of shops and business near the site on dust, noise, vibration and other dangers.

7.4.2 Destabilization and/or destruction of existing infrastructures along the roads

Arusha municipal council and the contractor to work in collaboration with the service providers (i.e. TANESCO, TTCL and AUWSA in Arusha) from the project planning stage, so as to reduce adverse impacts that would occur as a result of shifting the service lines from the road, during the roads construction.

A working plan should be prepared to avoid water or sewage overflowing on the surface and also make sure that the period for service cuts are as short as possible, and that they are according to a pre prepared schedule, that is known by the service users, in order to minimize disturbance to the users as save the costs that would have been incurred if the lines were to be destroyed by the project activities.

7.4.3 Safety and health risks

- Appropriate working gear (such as nose, ear mask and clothing) and good camp management shall be provided. During construction the contractors shall ensure that the campsites are fenced and hygienically kept with adequate provision of facilities including waste disposal
receptacles, sewage, fire fighting and clean and safe water supply. The contractor may be required to drill a borehole for obtaining water for construction.

- A well-stocked First Aid kit (administered by medical personnel) shall be maintained at each camp. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing some health education to the workforce.

### 7.4.4 Increased spread of HIV/AIDS

- Since construction camps will attract many job seekers and trade mongers, the contractor shall enforce a code of conduct in the camp to encourage respect for the local community and to maintain cleanliness of the camp at all times.
- The contractor shall deploy locally available labour to reduce risk of spreading of communicable diseases (especially STD).
- A safety, health and environment induction course shall be conducted to all workers, putting more emphasis on HIV/AIDS, which has become a national disaster.
- In order to prevent more HIV/AIDS infection, during the implementation phase, the project should include information education and communication component (IEC) in its budget. This will help to raise more awareness on HIV/AIDS, and means to suppress its incidence.

### 7.5 Cluster II Sub-project: Mitigation measures for Direct Long-Term Impacts

#### 7.5.1 Interference to local hydrology

- Construction of the facilities interferes with the natural surface and groundwater flow regimes. Good design features shall be adopted to ensure that the changes of the hydrological regimes are minimized and that any impacts are insignificant.
- The design will provide controlled and effective storm water dispersion by installation of adequate and appropriate drainage structures. The discharges points shall be well designed to avoid accelerate erosion downstream.
7.5.2 Loss of definite materials and land degradation

- Where construction materials such as gravel and stones are to be obtained from village lands or municipal councils, the material shall be purchased and this will be officially negotiated with villager/municipal authorities in order to avoid conflicts. The contractor may be compelled to pay a small fee to the authority in question.
- Potential long term environmental impacts of quarry sites relate to the way they are left once the resource has been extracted. In this case, all quarries shall be rehabilitated and proper landscaping done after completion of the construction.
- The significance to the region of the depletion of the material assets is not considered to be high as deposits throughout the remainder of the region will not be significantly affected by this project and they remain available for other projects.
- Obtaining sand from valleys and riversides must be well investigated to avoid accelerated land degradation and pollution of water sources and/or interfere with agricultural activities in farmland.

7.5.3 Interference to traditional norms and values

- Diffusion of cultural moral values and customs from one community to another is an inevitable especially where more than one cultural background is in contact to each other, maintenance of local ties becomes very difficult. Though the issue is very difficult to control, the communities shall be encouraged to stick to their traditions and copy only valuable traditions norms from the new comers.

7.6 Cluster III Sub-project: Mitigation measures for Direct Short-Term impacts

7.6.1 Increased water and soil pollution

- Spillage of fuels and chemicals is a risk, but spillages are likely to be local and remediation is considered easy.
- Spillage to watercourse is harmful to all living beings. In case of accidental spillage, the contractor shall exercise every effort in order to minimize the associated risks. For instance refuelling of plant or
transferred of materials should not be carried out near watercourses, and any local spillage to soil should immediately be remedied.

- Good house-keeping shall be practiced within material storage compounds or vehicle maintenance yards where the possibility of spillage is great.

### 7.6.2 Noise, vibration and air pollution

- The nuisance of noise, vibration and dust will be transient and good work practice can minimize them. In addition, most of these impacts are already being experienced due to the existing dumpsite.
- The impacts of noise and dust emissions will further be minimized by proper choice of plant and machinery (i.e. fitted with noise and dust silencers or reducers).
- Dust reaching the residential area at the proximity of the landfill shall be critically minimized by periodic water sprinkling on working sections. The contractor shall advise or notify local households on dust, noise, vibration and other dangers.

### 7.6.3 Safety and health risks

- Appropriate working gear (such as nose, ear mask and clothing) and good camp management shall be provided. During construction the contractors shall ensure that the campsites are fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, fire fighting and clean and safe water supply. The contractor may be required to drill a borehole for obtaining water for construction.
- A well-stocked First Aid kit (administered by medical personnel) shall be maintained at each camp. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing some health education to the workforce.

### 7.6.4 Increased spread of HIV/AIDS

- Since construction camps will attract many job seekers and trade mongers, the contractor shall enforce a code of conduct in the camp to encourage respect for the local community and to maintain cleanliness of the camp at all times.
The contractor shall deploy locally available labour to reduce risk of spreading of communicable diseases (especially STD).

- A safety, health and environment induction course shall be conducted to all workers, putting more emphasis on HIV/AIDS, which has become a national disaster.
- In order to prevent more HIV/AIDS infection, during the implementation phase, the project should include information education and communication component (IEC) in its budget. This will help to raise more awareness on HIV/AIDS, and means to suppress its incidence.

7.7 Cluster III Sub-project: Mitigation measures for Direct Long-Term Impacts

7.7.1 Landscape degradation

- Trees planting campaign will be necessary to restore the original environment of the area after completion of construction. Also, any cleared plant material and topsoil shall be stockpiled so as to assist in replanting scheme.
- Excavated soils from the dumpsite area shall be stockpiled and later on be used as daily and final cover material.
- Borrow pits and quarries will be reinstated and blended to fit the surrounding landscape environment.
- Contract documents shall specify the disposal of spoil material not used for embankment.

7.7.2 Interference to local hydrology

- Construction of the facilities interferes with the natural surface and groundwater flow regimes. Good design features shall be adopted to ensure that the changes of the hydrological regimes are minimized and that any impacts are insignificant.
- The design will provide controlled and effective storm water dispersion by installation of adequate and appropriate drainage structures. The discharges points shall be well designed to avoid accelerate erosion downstream.
7.7.3 Health and safety of workers

- Workers shall be provided with protective gears such as masks, gloves, boots etc.
- Provision of well serviced fire extinguishers, and any detected fire shall be put out immediately.
- The landfill site shall be provided with facilities such as toilets, clean and safe water, proper dining area etc to protect their health.

7.7.4 Loss of definite materials and land degradation

- Where construction materials such as gravel and stones are to be obtained from village lands, the material shall be purchased and this will be officially negotiated with villagers and/or village government in order to avoid conflicts. The contractor may be compelled to pay a small fee to the villager and/or village government.
- Potential long term environmental impacts of borrow pits and quarry sites relate to the way they are left once the resource has been extracted. In this case, all borrow pits and quarries shall be rehabilitated and proper landscaping done after completion of the individual facility construction. Pits shall not be left with steep or vertical sides.
- The topsoil (except for the dumpsite area) shall be stock piled for later use in reinstating the pit. Shallow slopes will encourage rapid re-vegetation thus preventing erosion as well as providing safety to animals. Excavated soils from the landfill site shall be used for daily and final waste covers during the operation phase.
- The significance to the region of the depletion of the material assets is not considered to be high as deposits throughout the remainder of the region will not be significantly affected by this project and they remain available for other projects.
- Obtaining sand from valleys and riversides must be well investigated to avoid accelerated land degradation and pollution of water sources and/or interfere with agricultural activities in farmland.

7.4.5 Risks of ground water pollution due to leachate

- All surface run-offs shall be routed away from the site to prevent additional of water into the landfill, and also prevent pollution of the runoff, which ultimately feeds into river Murriet.
The landfill shall be lined with synthetic liners to intercept leachate, and provided with leachate collection pipes, that will drain the leachate to treatment ponds.

- The construction of the landfill shall include construction properly designed leachate treatment ponds, which shall treat the collected leachate on site.

7.4.6 Risks explosions and fire hazards

- Education to workers on fire hazards prevention and on proper use of fire extinguishers
- Provision of well serviced fire extinguishers, and any detected fire shall be put out immediately.
- Workers shall be provided with protective gears.
- Activities such as cooking and cigarette smoking in the landfill shall be prohibited.

7.4.7 Threats to public health

- Release of leachate and landfill gases shall be monitored regularly. The leachate shall be collected and treated in stabilization lagoons to be constructed at the dumpsite.
- The waste shall be covered after each fill and at the end of the day be provided with a final cover. This shall prevent waste scattering and also prevent rodents and flies from feeding on the waste materials.
- The landfill site shall be fenced to prevent scattering wind-blown waste materials.
- Families residing within the 100 m of the dump buffer zone shall be compensated and moved from the area before the construction of landfill.
8.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

8.1 Environmental and Social Management Plan

The Environmental and Social Management Plan (ESMP) presents the implementation schedule of the proposed mitigation measures to both environmental and social impacts as well as planning for long-term monitoring activities. For the proposed core urban infrastructure construction works, the ESMP is given in Tables 8.2-8.4. The ESMP also includes the associated environmental costs needed to implement the recommended mitigation measures. The engineering designs have already included some of the mitigation measures recommended in this report. Additional recommendations are provided in the ESMP to enable the proposed facilities to be more environmentally friendly. The implementation steps will involve the contractor, the Resident Engineer, Municipal Councils, infrastructure users and the local communities at large.

8.2 Environmental Monitoring

The national EIA guidelines require the developer to prepare and undertake monitoring plan and regular auditing. Monitoring is needed to check if and to what extent the impacts are mitigated, benefits enhanced and new problems addressed. Recommendations for monitoring have been included in the ESMP (Table 9.1). The ESMP also assigns responsibilities for monitoring activities. However, the division/ward environmental committees and municipal environmental committee will participate in the long-term daily monitoring of the project road.

8.3 Implementation of the ESMP

The environmental measures incorporated in the detailed engineering design will be attached to the contract documents. The contractor shall take stock of the contents of the Environmental and Social Impact Assessment Statement of the Project.

An environmental expert should be appointed to assist the Resident Engineer, in order to make sure that the environmental measures recommended in this report are effectively complied with and timely adjusted whenever necessary. The expert will be familiar with the scientific measurement of environmental impacts and remedies. He/she will work on a part-time basis and may be selected, by the firm in-charge of supervision works, from the roster of national environmental experts. He will liaise with
the relevant public agencies and will carry out the training scheme associated to his assignment.

8.4 Personnel and training needs

As for all other large construction projects, the contractor who will Construct Arusha Municipality facilities will be supervised by a selected consulting firm. One of the team members of the supervision team will be Environmental supervisor who is an expert in Environmental Management issues especially of construction project. One of his tasks will be to oversee contractor implement the mitigation measures proposed by the ESMP during construction phase. His other duties will be to assist the contractor in the implementation of the Environmental Monitoring Plan during construction period. The environmental supervisor will write a monthly report which will reach the Municipal council through his/her firm.

Municipal council will provide PMO-LGRG and NEMC with reports on environmental compliance during implementation as part of their annual progress reports and annual environmental monitoring reports. Depending on the implementation status of environmentally sensitive areas of the project, NEMC will perform annual environmental reviews in which environmental concerns raised by the project will be reviewed alongside project implementation.

The Environmental Section of the Municipal council is responsible for the management of Environment in Arusha Municipality. For this project this section will work hand in hand with the environmental supervisor in implementing the Environmental and Social Management Plan and Environmental and Social Monitoring plan during construction phase. After construction the environmental section will have the responsibility to monitor the environmental impacts during the actual usage of the facilities. The remuneration of the environmental supervisor is included in the BoQ for supervision works and it will not be part of the ESMP costs.

The current number staff in this Environmental section in Arusha Municipality is four (4) which is enough for the environmental management of the subprojects during and after construction. However, there are other sections in the Municipal council that will be involved in the management of the environment of this subprojects indirectly, these include:

- Roads section under the Engineering Department- This section will be responsible for the maintenance of the roads.
- Health – This section will be responsible for Solid and liquid waste management including landfill.
- Water – This section will be responsible for water supply and water quality issues.
In the view of the above, it can be observed that Arusha Municipality has enough staff to oversee the environment during and after construction of subprojects. During consultation it was observed that there is a need for these staff to be trained especially on the Environmental Management of Construction works. Table 8.1 present the total number of staff to in the particular section to be trained and the type of training required. The costs and duration of training are provided in the ESMP (Table 8.2).

**Table 8.1: Training needs for Environmental Management in Arusha Municipality**

<table>
<thead>
<tr>
<th>Department</th>
<th>Section</th>
<th>Total no of technical staff</th>
<th>No of staff to be trained</th>
<th>Type of training needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>Roads</td>
<td>8</td>
<td>8</td>
<td>- Training/mentoring in relevant skills in project design and supervision.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Environmental Management in construction works</td>
</tr>
<tr>
<td>Town Planning and Environment</td>
<td>Environment</td>
<td>4</td>
<td>4</td>
<td>- Training in conducting EIA, monitoring and Environment auditing skills.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Environmental Management in construction works</td>
</tr>
<tr>
<td>Health</td>
<td></td>
<td>31</td>
<td>10</td>
<td>- Short training in term training in EIA approaches in solid waste and liquid waste management, landfill management, solid waste recycling techniques, approaches of PPP in solid and liquid waste management.</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>2</td>
<td>2</td>
<td>- Clean water management and wells management</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Environmental Management in construction works</td>
</tr>
<tr>
<td>Total</td>
<td>All Sections</td>
<td>45</td>
<td>24</td>
<td>(UWP Consult, 2009)</td>
</tr>
</tbody>
</table>
8.5 Environmental cost

The principal environmental cost includes the cost for implementing the mitigation measures proposed and that for carrying out monitoring of specific environmental parameters. These costs are indicated in Tables 8.2-8.4. It should be noted that most of the costs for mitigation measures are already included in the bills of quantities of the overall works. The costs for the environmental supervisor shall be included in the overall supervision cost of the works. The supervisor shall be engaged for at least 3 man-days a month over the entire construction period.

Table 8.2: ESMP for Cluster I Sub-project (Roads)

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation Time frame</th>
<th>Estimation cost (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-construction phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of property/farms/land take and possible resettlement</td>
<td>o Development and implementation of the resettlement action plan (RAP), consistent with OP 4.12. see the RAP that has been prepared as a separate document from this ESIA</td>
<td>o WB/ Municipal Council/ Contractor/ Env. Supervisor</td>
<td>Before and during construction phase</td>
<td>1,000</td>
</tr>
<tr>
<td></td>
<td>o Confine clearance to road reserve/construction site boundary.</td>
<td>o Contractor/ Env. Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate Knowledge of Environmental Management Issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Training of 12 Municipal council staff from various sections</td>
<td>o Municipal council (Road, Environment, Health and water sections)</td>
<td>One Month Short Course.</td>
<td>47,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Reputable training institution on Environmental Issues</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o World Bank as the financer</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Construction phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil and water pollution</td>
<td>o In case of accidental spillage, the contractor shall exercise every effort in order to minimize the associated risks.</td>
<td>o Contractor/ Municipal Council/ Env. Supervisor</td>
<td>During Construction and operation</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>o Practice Good housekeeping.</td>
<td>o Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o The use of silt fences and hay bales to remove suspended solids from surface</td>
<td>o Contractor/ Env. Supervisor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation Time frame</th>
<th>Estimated cost (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water runoff</td>
<td>o The use of silt curtains to minimize sediment suspension and transport while working near water crossings.</td>
<td>o Contractor/Env. Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Erosion and instability of Slopes</td>
<td>o Unnecessary ground clearance and sensitive re-alignments shall be avoided.</td>
<td>o Contractor</td>
<td>During Design and Construction</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>o Lined drainage channels at sensitive terrains shall be provided to control speed and volumes of storm-water.</td>
<td>o Consultant, Env. Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o The discharge points must be carefully chosen to avoid erosion of arable land and creation of gullies.</td>
<td>o Consultant, Env. Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of definite materials and Land degradation</td>
<td>o Where construction materials such as gravel and stones are to be obtained from village lands, the material shall be purchased and this will be officially negotiated with villagers and/or village government in order to avoid conflict.</td>
<td>o Contractor/Consultant/Village Leaders</td>
<td>During Mobilization, Construction and after construction</td>
<td>1,000</td>
</tr>
<tr>
<td></td>
<td>o All borrow pits and quarries shall be rehabilitated and proper landscaping done after completion of the road construction.</td>
<td>o Contractor /Env Supervisor/ Municipal Council</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o The topsoil shall be stock piled for later use in reinstating the pit.</td>
<td>o Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Obtaining sand from valleys and riversides must be well investigated to</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation Time frame</th>
<th>Estimated cost (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise pollution</td>
<td>avoid accelerated land degradation and pollution of water sources and/or interfere with agricultural activities in farmland.</td>
<td>o Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise pollution</td>
<td>o Provide working/protective gears to workers</td>
<td>o Contractor</td>
<td>Construction and operation phase</td>
<td>1,000</td>
</tr>
<tr>
<td>Noise pollution</td>
<td>o Proper choice of equipment which offer environmental advantages</td>
<td>o Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air pollution</td>
<td>o Watering working sections (especially near human habitation)</td>
<td>o Contractor</td>
<td>Construction and operation phase</td>
<td>1,000</td>
</tr>
<tr>
<td>Vibration</td>
<td>o Advance notice to local communities</td>
<td>o Contractor</td>
<td>Construction and operation phase</td>
<td>1,000</td>
</tr>
<tr>
<td>Vibration</td>
<td>o Proper location of quarry sites</td>
<td>o Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased Road Accidents</td>
<td>o Traffic management plan (in both English and Swahili)</td>
<td>o Design Engineer/Contractor</td>
<td>Constructional Phase</td>
<td>3,000</td>
</tr>
<tr>
<td>Increased Road Accidents</td>
<td>o Speed limits in villages</td>
<td>o Design Engineer/Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased Spread of HIV/AIDS</td>
<td>o Conduct seminars to road users</td>
<td>o Traffic police/Local community</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased Spread of HIV/AIDS</td>
<td>o Safety, Health and Environment (SHE) induction course</td>
<td>o Contractor/ Municipal Council/ NGOs/CBOs/local</td>
<td></td>
<td>3,000</td>
</tr>
</tbody>
</table>

Impact Mitigation measure in the table:
- Avoid accelerated land degradation and pollution of water sources and/or interfere with agricultural activities in farmland.
- Provide working/protective gears to workers.
- Proper choice of equipment which offer environmental advantages.
- Watering working sections (especially near human habitation).
- Proper choice of equipment which offer environmental advantages.
- Advance notice to local communities.
- Proper location of quarry sites.
- Traffic management plan (in both English and Swahili).
- Speed limits in villages.
- Conduct seminars to road users.
- Safety, Health and Environment (SHE) induction course.
<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation frame</th>
<th>Estimated cost (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>o Support HIV/AIDS campaigns</td>
<td>communities</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Provision of condoms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety and health risks</td>
<td>o Regular maintenance of construction machinery to minimise accidents during construction period.</td>
<td>o Contractor</td>
<td>Short-term (Construction phase)</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>o Safety, Health and Environment (SHE) induction course</td>
<td>o Contractor/ Env. Supervisor/ Workers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Comply with the Occupation Health and Safety Act (2003) by provision of safety gears.</td>
<td>o Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Adequate signage and availability of First Aid Kit</td>
<td>o Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporal Loss of access to services</td>
<td>o The Municipal to involve the affected service providers in the designing and construction phase.</td>
<td>o Contractor/ Municipal Council/ Relevant Service providers</td>
<td>Short-term (Construction phase)</td>
<td>1,000</td>
</tr>
<tr>
<td></td>
<td>o The general public and the service providers to be notified in advance, so that they can be well prepared during the period on service cut.</td>
<td>Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Roads signals and diversions to be created where the road has been closed. The signals to be in both language and use simple signs that could be understood even by school children.</td>
<td>Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o The budget for (or part of) re-</td>
<td>Contractor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation Time frame</th>
<th>Estimated cost (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>installing the service to be included in the project costs.</td>
<td>Municipal Council/</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Destabilization and/or Destruction of the existing infrastructures along the roads | o Integrated planning is needed with owners of infrastructures at the proposed subproject  
o Early notice to users before interruption | o Municipal Council/ TANESCO/TTCL/ AWASA  
o Contractor/ Municipal Council |                      |                      |
|        | Operation phase     |                         |                      |                      |
|        | Interference to local hydrology | o Good design and engineering practice  
o Efficient drainage system  
o Selection of proper outfall point so as to avoid flooding at the discharge point | o Design engineer/ Municipal Council/NEMC  
o Design engineer /Contractor  
o Design engineer /Contractor | Long-term | 3,000 |
|        | Safety of human beings (Increased Road accidents) | o Traffic management plan (in both English and Swahili)  
o Speed limits in villages  
o Conduct seminars to road users | o Design Engineer/Contractor  
o Design Engineer/Contractor  
o Traffic police | Long-term | 3,000 |
|        | Noise, vibration and air pollution | o Good design practice  
o Provide side-hedges | o Design Engineer/ Contractor  
o Env. Section of the | Operation phase | 1,000 |

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation Time frame</th>
<th>Estimated cost (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil and water pollution</td>
<td>o Enforce speed and exhaust limits</td>
<td>Municipal council / Traffic police</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Proper handling of waste especially near water course</td>
<td>Contractor/ Env. Section of the Municipal council</td>
<td>Operation phase</td>
<td>2,000</td>
</tr>
<tr>
<td></td>
<td>o Watering the surface to minimize dust deposition into water courses</td>
<td>Design Engineer/ Contractor/ Env. Section of the Municipal council</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Encase of spillage, proper soil remediation to be followed, depending on the type/amount of spillage</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Cost**

(UWP Consult, 2009)

69,000

**Table 8.3: ESMP for Cluster II Sub-project (Bondeni Drain)**

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation Time frame</th>
<th>Estimated cost (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil and water pollution</td>
<td>o In case of accidental spillage, the contractor shall exercise every effort in order to minimize the associated risks.</td>
<td>Contractor/ Municipal Council/Env. Supervisor</td>
<td>During Construction and operation</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>o Practice Good housekeeping.</td>
<td>Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of definite materials and Land degradation</td>
<td>o Where construction materials such as gravel and stones are to be obtained from village lands, the material shall be</td>
<td>Contractor/Consultant/Village Leaders</td>
<td>During Mobilization, Construction and after construction</td>
<td>1,000</td>
</tr>
</tbody>
</table>
### Impact

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation Time Frame</th>
<th>Estimated cost (US $)</th>
</tr>
</thead>
</table>
| Noise pollution | o Provide working gear to workers  
                             o Proper choice of equipment which offer environmental advantages                                   | o Contractor                                | Construction and operation phase | 1,000  |
| Air pollution | o Watering working sections (especially near human habitation)                                        | o Contractor                                | Construction and operation phase | 1,000  |
| Vibration | o Advance notice to local communities  
                             o Proper location of quarry sites                                                             | o Contractor                                | Construction and operation phase | 1,000  |
<p>| Increased Road | o Traffic management plan (in both English)                                                           | o Design                                   | Constructional        | 1,000  |</p>
<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation Time frame</th>
<th>Estimated cost (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased Spread of HIV/AIDS</td>
<td>o Safety, Health and Environment (SHE) induction course</td>
<td>o Contractor/ Municipal Council/ NGOs/CBOs/local communities</td>
<td>Short-term (Construction phase)</td>
<td>3,000</td>
</tr>
</tbody>
</table>
| Safety and health risks                                                | o Regular maintenance of construction machinery to minimise accidents during construction period.  
|                                                                      | o Safety, Health and Environment (SHE) induction course                             | o Contractor                                                                          | Short-term (Construction phase) | 500                  |
|                                                                      | o Adequate signage and availability of First Aid Kit                                | o Contractor/ Env. Supervisor/ Workers                                                 |                       |                      |
|                                                                      | o Provision of condoms                                                             | o Contractor                                                                          |                       |                      |
| Destabilization and/or destruction of the existing infrastructures    | o Integrated planning is needed with owners of infrastructures at the proposed subproject | o Municipal Council/ TANESCO/TTCL/ AWASA                                               |                       | 1,000                |
| Accidents and Swahili)                                                | o Speed limits in villages                                                          | Engineer/Contractor                                                                    | Phase                 |                      |
|                                                                      | o Conduct seminars to road users                                                    | o Design Engineer/Contractor                                                          | Phase                 |                      |
|                                                                      |                                                                                     | o Traffic police/ Local community                                                     | Phase                 |                      |
| Destabilization and/or destruction of the existing infrastructures    |                                                                                     |                                                                                       |                       |                      |
|                                                                      |                                                                                     |                                                                                       |                       |                      |

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation Time frame</th>
<th>Estimated cost (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>along the roads</td>
<td>o Early notice to users before interruption</td>
<td>o Contractor / Municipal Council</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interference to local hydrology</td>
<td>o Good design and engineering practice</td>
<td>o Design engineer / Municipal Council/NEMC</td>
<td>Long-term</td>
<td>2,000</td>
</tr>
<tr>
<td></td>
<td>o Efficient drainage system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Selection of proper outfall point so as to avoid flooding at the discharge point</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Design engineer / Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Design engineer / Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cost</td>
<td></td>
<td></td>
<td></td>
<td>11,500</td>
</tr>
</tbody>
</table>

(UWP Consult, 2009)

**Table 8.4: ESMP for Cluster III Sub-project (Landfill)**

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation Time frame</th>
<th>Estimated cost (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-construction phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of property/land take and possible resettlement during creation of 100m landfill buffer zone</td>
<td>o Development and implementation of the resettlement action plan (RAP), consistent with OP 4.12. see the RAP that has been prepared as a separate document from this ESIA</td>
<td>o Contractor / Env Supervisor / Municipal Council</td>
<td>Before and during construction phase</td>
<td>1,000</td>
</tr>
<tr>
<td>Impact</td>
<td>Mitigation measure</td>
<td>Responsible institution</td>
<td>Time frame</td>
<td>Estimated cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation Time frame</th>
<th>Estimated cost (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Soil and water pollution | o In case of accidental spillage of oils or any other waste, the contractor shall exercise every effort in order to minimize the associated risks.  
  o Practice Good housekeeping.  
  o Route away surface runoff into the landfill, and from the landfill into river Burka  
  o The use of silt curtains to minimize sediment suspension and transport while working near water crossings.  
  o The use of Landfill liner to control leachate from the Landfill | o Contractor/  
Municipal Council/Env. Supervisor  
  o Contractor  
  o Contractor/ Env. Supervisor  
  o Contractor/ Env. Supervisor  
  o Contractor/ Env. Supervisor | During Construction and operation | N/A |
| Loss of definite materials and Land degradation | o Where construction materials such as gravel and stones are to be obtained from village lands, the material shall be purchased and this will be officially negotiated with villagers and/or village government in order to avoid conflict.  
  o All borrow pits and quarries shall be rehabilitated and proper landscaping done after completion of the road construction.  
  o The topsoil shall be stock piled for later use in reinstating the pit. | o Contractor/Consultant/Village Leaders  
  o Contractor /Env Supervisor/ Municipal Council  
  o Contractor | During Mobilization, Construction and after construction | 1,000 |
<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation Time frame</th>
<th>Estimated cost (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>O Obtaining sand from valleys and riversides must be well investigated to avoid accelerated land degradation and pollution of water sources and/or interfere with agricultural activities in farmland.</td>
<td>O Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise pollution</td>
<td>O Provide safety working gear to workers</td>
<td>O Contractor</td>
<td>Construction and operation phase</td>
<td>1,000</td>
</tr>
<tr>
<td></td>
<td>O Proper choice of equipment which offer environmental advantages</td>
<td>O Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air pollution</td>
<td>O Watering working sections (especially near human habitation)</td>
<td>O Contractor</td>
<td>Construction and operation phase</td>
<td>1,000</td>
</tr>
<tr>
<td></td>
<td>O Proper choice of equipment which offer environmental advantages</td>
<td>O Contractor/ Env. Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td>O Advance notice to local communities</td>
<td>O Contractor</td>
<td>Construction and operation phase</td>
<td>1,000</td>
</tr>
<tr>
<td></td>
<td>O Proper location of quarry sites</td>
<td>O Contractor/ Env. Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased Spread of HIV/AIDS</td>
<td>O Safety, Health and Environment (SHE) induction course</td>
<td>O Contractor/ Municipal Council/ NGOs/CBOs/local communities</td>
<td>Construction and operation phase</td>
<td>3,000</td>
</tr>
<tr>
<td></td>
<td>O Support HIV/AIDS campaigns</td>
<td>O Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O Provision of condoms</td>
<td>O Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety and health risks</td>
<td>O Regular maintenance of construction machinery to minimise accidents during construction period.</td>
<td>O Contractor</td>
<td>Short-term (Construction phase)</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>O Support HIV/AIDS campaigns</td>
<td>O Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O Provision of condoms</td>
<td>O Contractor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Impact

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation Time frame</th>
<th>Estimated cost (US $)</th>
</tr>
</thead>
</table>
| Interference to local hydrology | o Good design and engineering practice  
- Efficient drainage system  
- Selection of proper outfall point so as to avoid flooding at the discharge point | o Design engineer/ Municipal Council//NEMC  
- Design engineer /Contractor | Long-term | 3,000 |
| Noise, vibration and air pollution | o Good design practice  
- Proper selection of equipment to reduce noise  
- Soil covers on the waste to avoid air pollution. | o Design Engineer  
- Contractor / Env. Section of the council  
- Municipal Council | Operation phase | 1,000 |
| Risks of ground water pollution due to leachate | o The use of Landfill liners to control leachate from the dumpsite  
- Adequate under drains for collection of leachate | Contractor/ Env. | Operation phase | 2,000 |

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation Time Frame</th>
<th>Estimated cost (US $)</th>
</tr>
</thead>
</table>
| Leachate                           | o The construction of the landfill shall include construction properly designed leachate treatment ponds, which shall treat the collected leachate on site.  
  o Provision of adequate storm drains around the dumpsite to stop the runoff from reaching the waste  
  o Covering the waste with soil followed by adequate compaction to minimize water percolation. | Supervisor/ Env. Section of the Municipal council                                     |                       |                       |
| Health and safety of workers        | o Regular maintenance of construction machinery to minimize accidents during construction period.  
  o Safety, Health and Environment (SHE) induction course  
  o Adequate signage and availability of First Aid Kit  
  o The landfill site shall be provided with facilities such toilets, clean and safe water, proper dining area etc to protect their health. | Contractor/ Env. Supervisor/ Env. Section of the Municipal council  
  Env. Supervisor/ Env. Section of the Municipal council | Operation phase | 5,000 |
| Risks explosions                    | o Education to workers on fire hazards                                            |                                                        |                       | 5,000 |

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsible institution</th>
<th>Mitigation Time Frame</th>
<th>Estimated cost (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>and fire hazards</td>
<td>prevention and on proper use of fire extinguishers</td>
<td>Env. Section of the Municipal council</td>
<td>Operation phase</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Provision of well serviced fire extinguishers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Workers shall be provided with protective gears.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Cooking and cigarette smoking in the landfill shall be prohibited.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threats to public health</td>
<td>o Release of leachate and landfill gases shall be monitored regularly.</td>
<td>Contractor/Env. Supervisor/Env. Section of the Municipal council</td>
<td>Operation phase</td>
<td>6,000</td>
</tr>
<tr>
<td></td>
<td>o Onsite treatment of leachate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Provision of daily and final waste covers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o The landfill site shall be fenced to prevent scattering wind-blown waste materials.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Families residing within the 100 m of the dump buffer zone shall be compensated and moved from the area before the construction of landfill.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td></td>
<td></td>
<td>Total Cost 30,000</td>
<td></td>
</tr>
<tr>
<td><em>(UWP Consult, 2009)</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9.0 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

9.1 Environmental and Social Monitoring

Monitoring of the anticipated environmental and social impacts in the receiving environments is important. It helps in determining the effects of the project activities on the environments enhancing understanding of cause effect relationships between human activities and environmental changes, and verifies the accuracy of prediction about the environmental impacts. It ensures compliance with regulatory measures and understanding the degree of implementation of EPM and its effectiveness. The monitoring results are also used extensively during the environmental auditing.

9.2 Environmental Audit

It is 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 ESIA documents in Tanzania, environmental audits would be a responsibility of the developer (the Arusha Municipal Council) and the National Environment Management Council (NEMC).

9.3 Monitoring Parameters

The selection of the parameters to be monitored is based on the high likelihood of occurrences of the selected parameters. Monitoring of these parameters will be done in various stages of the project as follows;

Pre construction stage
Monitoring of the parameters at this stage is meant to establish the baseline information of the target parameters in the project area.

Construction stage
Monitoring at this stage is meant to establish the pollution levels that arise from the construction activities.

Operation stage
Monitoring at this stage is meant to check on the impacts that might arise as the result of normal use of the infrastructure.
Decommissioning

Decommissioning is not anticipated in the foreseeable future. However, if this will happen, may entail change of use (functional changes) or demolition triggered by change of land use.
Table 9.1: Environmental and Social Monitoring Plan for Cluster I Subprojects (Roads)

<table>
<thead>
<tr>
<th>Pre construction stage</th>
<th>Parameters</th>
<th>Monitoring frequency</th>
<th>Sampling Area</th>
<th>Measurement Units</th>
<th>Method</th>
<th>Target level/Standard</th>
<th>Responsibility for monitoring</th>
<th>Annual costs estimates (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Air quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SO₂</td>
<td>Once before the</td>
<td>Project site</td>
<td>mg/kg</td>
<td>Detector tubes</td>
<td>0.1</td>
<td>Municipal council/Env. Section of the Municipal council</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>construction starts</td>
<td></td>
<td>(hourly)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOₓ</td>
<td></td>
<td>Project site</td>
<td>µg/nm³ (24 hrs)</td>
<td>Detector tubes</td>
<td>150</td>
<td></td>
<td>500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PM₁₀</td>
<td></td>
<td>Project site</td>
<td>µg/nm³ (hourly)</td>
<td>Mini-Vol Sampler</td>
<td>0.15</td>
<td></td>
<td>500</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CO₂</td>
<td></td>
<td>Project site</td>
<td>ppm (1 hr)</td>
<td>Detector tubes</td>
<td>35</td>
<td></td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>Noise Baseline</td>
<td>Noise level</td>
<td>Project site</td>
<td>dBA (equivalent)</td>
<td>Noise meter</td>
<td>55</td>
<td></td>
<td>500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Water pollution</td>
<td>Nitrate</td>
<td>Once before the construction work starts</td>
<td>mg/l</td>
<td>Sampling and analysis (Spectrophotometer)</td>
<td>30</td>
<td>Municipal council/Env. Section of the Municipal council</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rivers, shallow wells and other water bodies near the project sites</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>
## Construction stage

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Monitoring frequency</th>
<th>Sampling Area</th>
<th>Measurement Units</th>
<th>Method</th>
<th>Target level/Standard</th>
<th>Responsibility for monitoring</th>
<th>Annual costs estimates (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air pollution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SO₂</td>
<td>Three times a year</td>
<td>Project site</td>
<td>mg/kg (hourly)</td>
<td>Detector tubes</td>
<td>0.1</td>
<td>Contractor / Municipal council/ Env. Section of the Municipal council</td>
<td>1500</td>
</tr>
<tr>
<td>NOₓ</td>
<td>Three times a year</td>
<td>Project site</td>
<td>μg/nm³ (24 hrs)</td>
<td>Detector tubes</td>
<td>150</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>PM₁₀</td>
<td>Three times a year</td>
<td>Project site</td>
<td>μg/nm³ (hourly)</td>
<td>Mini-Vol Sampler</td>
<td>0.15</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>CO₂</td>
<td>Three times a year</td>
<td>Project site</td>
<td>ppm (1hr)</td>
<td>Detector tubes</td>
<td>35</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>Noise pollution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise level</td>
<td>Three times a year</td>
<td>Project site</td>
<td>dBA (equivalent)</td>
<td>Noise meter</td>
<td>55</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>Water pollution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrate</td>
<td>Three times a year</td>
<td>Project site</td>
<td>mg/l</td>
<td>Sampling and analysis (Spectrophotometer)</td>
<td>30</td>
<td>Contractor/ Municipal council/ Env. Section of the Municipal council</td>
<td>1200</td>
</tr>
<tr>
<td>Lead</td>
<td>Three times a year</td>
<td>All rivers/streams and shallow wells near the project sites</td>
<td>mg/l</td>
<td>Sampling and analysis (AAS)</td>
<td>0.05</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>Sulphate</td>
<td>Three times a year</td>
<td>Project site</td>
<td>mg/l</td>
<td>Sampling and analysis (Spectrophotometer)</td>
<td>600*</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>Turbidity</td>
<td>Three times a year</td>
<td>Project site</td>
<td>mg/l</td>
<td>Sampling and analysis (Spectrophotometer)</td>
<td>30</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>Three times a year</td>
<td>Project site</td>
<td>mg/l</td>
<td>Sampling and analysis (Spectrophotometer)</td>
<td></td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>Three times a year</td>
<td>Project site</td>
<td>pH Meter</td>
<td>6.5-9.2</td>
<td></td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Soil erosion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interference to local hydrology</td>
<td>Three times a year</td>
<td>In the all rivers /streams near project sites</td>
<td>Flooding levels</td>
<td>Volumetric measurements</td>
<td></td>
<td>Env. Section of the Municipal council / Contractor</td>
<td>1,000</td>
</tr>
<tr>
<td>Hydrometric</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Monitoring frequency</th>
<th>Sampling Area</th>
<th>Measurement Units</th>
<th>Method</th>
<th>Target level/Standard</th>
<th>Responsibility for monitoring</th>
<th>Annual costs estimates (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration levels</td>
<td>Three times a year</td>
<td>Project sites and all borrow pits</td>
<td>Number</td>
<td>Vibration meter</td>
<td>-</td>
<td>Contractor</td>
<td>1,000</td>
</tr>
<tr>
<td>Frequency of illness of construction workers</td>
<td>Once in a month for the construction period</td>
<td>Project site</td>
<td>Number of cases</td>
<td>Health records</td>
<td>-</td>
<td>Municipal Health officers</td>
<td>700</td>
</tr>
<tr>
<td>Employment opportunity</td>
<td>Three times a year</td>
<td>Project site</td>
<td>Number of local people employed in the project</td>
<td>Records, inquiries and observation</td>
<td>-</td>
<td>Municipal councils</td>
<td>N/A</td>
</tr>
<tr>
<td>Safety and health risks</td>
<td>Once a year</td>
<td>Project site</td>
<td>Number of safety measures provided</td>
<td>Records, inquiries and inspection</td>
<td>-</td>
<td>NEMC Municipal Council/ Contractor</td>
<td>1,000</td>
</tr>
<tr>
<td>Dust pollution</td>
<td>Twice a week</td>
<td>Project site</td>
<td>Frequency of water sprinkling</td>
<td>Inquiries and observation and Minimum dust emission</td>
<td></td>
<td>Contractor</td>
<td>Included in the contract lamp sum</td>
</tr>
</tbody>
</table>

**Operation stage**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Monitoring frequency</th>
<th>Sampling Area</th>
<th>Measurement Units</th>
<th>Method</th>
<th>Target level/Standard</th>
<th>Responsibility for monitoring</th>
<th>Annual costs estimates (Tshs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air pollution</td>
<td>Twice a year</td>
<td>Project site</td>
<td>mg/kg (hourly)</td>
<td>Detector tubes</td>
<td>0.1</td>
<td>Contractor Municipal Council/ Env. Section of the Municipal</td>
<td>1000</td>
</tr>
<tr>
<td>SO₂</td>
<td></td>
<td></td>
<td>Detector tubes</td>
<td></td>
<td>0.1</td>
<td>Contractor Municipal Council/ Env. Section of the Municipal</td>
<td>1000</td>
</tr>
<tr>
<td>NOₓ</td>
<td></td>
<td></td>
<td>Detector tubes</td>
<td></td>
<td>150</td>
<td>Contractor Municipal Council/ Env. Section of the Municipal</td>
<td>1000</td>
</tr>
<tr>
<td>Dust pollution (PM₁₀)</td>
<td></td>
<td></td>
<td>Detector tubes</td>
<td></td>
<td>0.15</td>
<td>Contractor Municipal Council/ Env. Section of the Municipal</td>
<td>1000</td>
</tr>
<tr>
<td>CO₂</td>
<td></td>
<td></td>
<td>Detector tubes</td>
<td></td>
<td>35</td>
<td>Contractor Municipal Council/ Env. Section of the Municipal</td>
<td>1000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Monitoring frequency</th>
<th>Sampling Area</th>
<th>Measurement Units</th>
<th>Method</th>
<th>Target level/Standard</th>
<th>Responsibility for monitoring</th>
<th>Annual costs estimates (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise pollution</td>
<td>Noise level</td>
<td>Twice a year</td>
<td>Project site</td>
<td>dBA (equivalent)</td>
<td>Noise meter</td>
<td>55</td>
<td>Contractor/ Env. Section of the Municipal council</td>
</tr>
<tr>
<td>Water pollution</td>
<td>Nitrate</td>
<td>Twice a year</td>
<td>Project site</td>
<td>mg/l</td>
<td>Sampling and analysis (Spectrophotometer)</td>
<td>30</td>
<td>Contractor / Env. Section of the Municipal council</td>
</tr>
<tr>
<td></td>
<td>Lead</td>
<td>Twice a year</td>
<td>All rivers/streams and shallow wells near the project sites</td>
<td>mg/l</td>
<td>Sampling and analysis (Spectrophotometer)</td>
<td>0.05</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>Sulphate</td>
<td>Twice a year</td>
<td>All rivers/streams and shallow wells near the project sites</td>
<td>mg/l</td>
<td>Sampling and analysis (AAS)</td>
<td>600*</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>Turbidity</td>
<td>Twice a year</td>
<td>All rivers/streams and shallow wells near the project sites</td>
<td>mg/l</td>
<td>Sampling and analysis (Spectrophotometer)</td>
<td>30</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>Hydrocarbons</td>
<td>Twice a year</td>
<td>All rivers/streams and shallow wells near the project sites</td>
<td>mg/l</td>
<td>Sampling and analysis (Spectrophotometer)</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>pH</td>
<td>Twice a year</td>
<td>All rivers/streams and shallow wells near the project sites</td>
<td>mg/l</td>
<td>pH Meter</td>
<td>6.5-9.2</td>
<td>200</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>Soil erosion</td>
<td>Twice during construction period</td>
<td>Project area</td>
<td>Level of erosions</td>
<td>Site inspection</td>
<td>-</td>
<td>Municipal council</td>
</tr>
<tr>
<td>Safety of human beings</td>
<td>Road accidents and roads signs</td>
<td>Three times a year for the project life span</td>
<td>Project site</td>
<td>Road signs and number of accidents</td>
<td>Records, inquiries and inspection</td>
<td>Zero accident and sufficient no of road signs</td>
<td>Traffic police /Municipal council</td>
</tr>
</tbody>
</table>

Total monitoring costs

36,100

(UWP Consult, 2009)
Table 9.2: Environmental and Social Monitoring Plan for Cluster II Subprojects (Bondeni Drain)

<table>
<thead>
<tr>
<th>Pre construction stage</th>
<th>Parameters</th>
<th>Monitoring frequency</th>
<th>Sampling Area</th>
<th>Measurement Units</th>
<th>Method</th>
<th>Target level/Standard</th>
<th>Responsibility for monitoring</th>
<th>Annual costs estimates (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air quality SO₂</td>
<td>Once before the construction starts</td>
<td>Project site</td>
<td>mg/kg (hourly)</td>
<td>Detector tubes</td>
<td>0.1</td>
<td>Municipal council/Env. Supervisor</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>NOₓ</td>
<td></td>
<td>Project site</td>
<td>µg/nm³ (24 hrs)</td>
<td>Detector tubes</td>
<td>150</td>
<td>Contractor</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>PM₁₀</td>
<td></td>
<td>Project site</td>
<td>µg/nm³ (hourly)</td>
<td>Mini-Vol Sampler</td>
<td>0.15</td>
<td>Municipal council/Env. Supervisor</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>CO₂</td>
<td></td>
<td>Project site</td>
<td>ppm (1hr)</td>
<td>Detector tubes</td>
<td>35</td>
<td>Contractor</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Noise Baseline</td>
<td>Noise level</td>
<td>Project site</td>
<td>dBA (equivalent)</td>
<td>Noise meter</td>
<td>55</td>
<td>Contractor</td>
<td>500</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Construction stage</th>
<th>Parameter</th>
<th>Monitoring frequency</th>
<th>Sampling Area</th>
<th>Measurement Units</th>
<th>Method</th>
<th>Target level/Standard</th>
<th>Responsibility for monitoring</th>
<th>Annual costs estimates (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air pollution SO₂</td>
<td>Three times a year</td>
<td>Project site</td>
<td>mg/kg (hourly)</td>
<td>Detector tubes</td>
<td>0.1</td>
<td>Contractor</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>NOₓ</td>
<td>Three times a year</td>
<td>Project site</td>
<td>µg/nm³ (24 hrs)</td>
<td>Detector tubes</td>
<td>150</td>
<td>Contractor</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>PM₁₀</td>
<td>Three times a year</td>
<td>Project site</td>
<td>µg/nm³ (hourly)</td>
<td>Mini-Vol Sampler</td>
<td>0.15</td>
<td>Contractor</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>CO₂</td>
<td>Three times a year</td>
<td>Project site</td>
<td>ppm (1hr)</td>
<td>Detector tubes</td>
<td>35</td>
<td>Contractor</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>Noise pollution Noise level</td>
<td>Once in a year</td>
<td>Project site</td>
<td>dBA (equivalent)</td>
<td>Noise meter</td>
<td>55</td>
<td>Contractor</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>Interference to local hydrology Hydrometric</td>
<td>Once during rain season in the construction period</td>
<td>In the all rivers /streams near project sites</td>
<td>Flooding levels</td>
<td>Volumetric measurements</td>
<td>-</td>
<td>Envi. Supervisor /Municipal Council/Contractor</td>
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<tr>
<td>Vibration</td>
<td>Vibration levels</td>
<td>Three times a year</td>
<td>Project sites and all borrow pits</td>
<td>Number</td>
<td>Vibration meter</td>
<td>-</td>
<td>Contractor</td>
<td>1,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Monitoring frequency</th>
<th>Sampling Area</th>
<th>Measurement Units</th>
<th>Method</th>
<th>Target level/ Standard</th>
<th>Responsibility for monitoring</th>
<th>Annual costs estimates (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of illness of construction workers</td>
<td>Illness of construction workers</td>
<td>Once during the construction period</td>
<td>Project site</td>
<td>Number of cases</td>
<td>Health records</td>
<td>-</td>
<td>Municipal Health officers</td>
</tr>
<tr>
<td>Employment opportunity</td>
<td>Percentage of local construction labourers</td>
<td>Three times a year</td>
<td>Project site</td>
<td>Number of local people employed in the project</td>
<td>Records, inquiries and observation</td>
<td>-</td>
<td>Municipal councils</td>
</tr>
<tr>
<td>Safety and health risks</td>
<td>Number and type of safety equipment such as mask, helmet gloves and ear plugs. Health and sanitation facilities in camps.</td>
<td>Once a year</td>
<td>Project site</td>
<td>Number of safety measures provided</td>
<td>Records, inquiries and inspection</td>
<td>-</td>
<td>NEMC/ Municipal Council/ Contractor</td>
</tr>
<tr>
<td>Dust</td>
<td>Water sprinkling</td>
<td>Twice a week</td>
<td>Project site</td>
<td>Frequency of water sprinkling</td>
<td>Inquiries and observation and Minimum dust emission</td>
<td>Contractor</td>
<td>Included in the contract lamp sum</td>
</tr>
</tbody>
</table>

**Operation stage**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Monitoring frequency</th>
<th>Sampling Area</th>
<th>Measurement Units</th>
<th>Method</th>
<th>Target level/ Standard</th>
<th>Responsibility for monitoring</th>
<th>Annual costs estimates (Tshs)</th>
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</thead>
<tbody>
<tr>
<td>Interference to local hydrology</td>
<td>Hydrometric</td>
<td>Once during rain season in the operation period</td>
<td>In the streams near project sites</td>
<td>Flooding levels</td>
<td>Volumetric measurements</td>
<td>-</td>
<td>Env. Section of the Municipal council /Contractor</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>Erosion</td>
<td>Twice during operation period</td>
<td>Project area</td>
<td>Level of erosions</td>
<td>Site inspection</td>
<td>-</td>
<td>Municipal council</td>
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</table>

**Total monitoring costs**

(UWP Consult, 2009)
Table 9.3: Environmental and Social Monitoring Plan for Cluster III Subprojects (Landfill)

<table>
<thead>
<tr>
<th>Pre construction stage</th>
<th>Parameters</th>
<th>Monitoring frequency</th>
<th>Sampling Area</th>
<th>Measurement Units</th>
<th>Method</th>
<th>Target level/Standard</th>
<th>Responsibility for monitoring</th>
<th>Annual costs estimates (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air quality</td>
<td>SO₂</td>
<td>Once before the construction starts</td>
<td>Project site</td>
<td>mg/kg (hourly)</td>
<td>Detector tubes</td>
<td>0.1</td>
<td>Municipal council/Env. Supervisor</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>NOₓ</td>
<td>Project site</td>
<td>µg/m³ (24 hrs)</td>
<td>Detector tubes</td>
<td>150</td>
<td>Municipal council/Env. Supervisor</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PM₁₀</td>
<td>Project site</td>
<td>µg/m³ (hourly)</td>
<td>Mini-Vol Sampler</td>
<td>0.15</td>
<td>Municipal council/Env. Supervisor</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CO₂</td>
<td>Project site</td>
<td>ppm (1 hr)</td>
<td>Detector tubes</td>
<td>35</td>
<td>Municipal council/Env. Supervisor</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Noise Baseline</td>
<td>Noise level</td>
<td>Project site</td>
<td>dBA (equivalent)</td>
<td>Noise meter</td>
<td>55</td>
<td>Municipal council/Env. Supervisor</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Ground and surface Water pollution</td>
<td>Nitrate</td>
<td>Once before the construction work starts</td>
<td>River Burka/shallow wells</td>
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<td>Sampling and analysis (Spectrophotometer)</td>
<td>30</td>
<td>Municipal council/Env. Supervisor</td>
<td>400</td>
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<tr>
<td></td>
<td>Lead</td>
<td></td>
<td>mg/l</td>
<td>Sampling and analysis (AAS)</td>
<td>0.05</td>
<td>Municipal council/Env. Supervisor</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Sulphate</td>
<td></td>
<td>mg/l</td>
<td>Sampling and analysis (Spectrophotometer)</td>
<td>600*</td>
<td>Municipal council/Env. Supervisor</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Turbidity</td>
<td>NTU</td>
<td>Sampling and analysis (Spectrophotometer)</td>
<td>35</td>
<td>Municipal council/Env. Supervisor</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hydrocarbons</td>
<td>Mg/l</td>
<td>Sampling and analysis (HPLC)</td>
<td>600</td>
<td>Municipal council/Env. Supervisor</td>
<td>600</td>
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<td></td>
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<tr>
<td></td>
<td>pH</td>
<td>-</td>
<td>pH meter</td>
<td>6.5-9.2</td>
<td>Municipal council/Env. Supervisor</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td>Baseline information on biodiversity</td>
<td>Along River Burka/ground water sources nearby</td>
<td>type and number of living organisms</td>
<td>Counting and Observation</td>
<td>-</td>
<td>Municipal council/Env. Supervisor</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td>Construction stage</td>
<td>Parameter</td>
<td>Monitoring frequency</td>
<td>Sampling Area</td>
<td>Measurement Units</td>
<td>Method</td>
<td>Target level/Standard</td>
<td>Responsibility for monitoring</td>
<td>Annual costs estimates (USD)</td>
</tr>
<tr>
<td>Air pollution</td>
<td>SO₂</td>
<td>Twice during</td>
<td>Project site</td>
<td>mg/kg</td>
<td>Detector tubes</td>
<td>0.1</td>
<td>Contractor</td>
<td>1000</td>
</tr>
<tr>
<td>Parameters</td>
<td>Monitoring frequency</td>
<td>Sampling Area</td>
<td>Measurement Units</td>
<td>Method</td>
<td>Target level/ Standard</td>
<td>Responsibility for monitoring</td>
<td>Annual costs estimates (USD)</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------------</td>
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<td>--------</td>
<td>-------------------------</td>
<td>-------------------------------</td>
<td>-------------------------------</td>
<td></td>
</tr>
<tr>
<td>Soil erosion</td>
<td>Once in three month for construction period</td>
<td>project area</td>
<td>Level of erosions</td>
<td>Site inspection</td>
<td></td>
<td>Municipal environmental officer/ Contractor</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>Loss of natural habitat</td>
<td>Destruction wetlands</td>
<td>Once in three month for construction period</td>
<td>Along River Burka</td>
<td>-</td>
<td>Inspection</td>
<td></td>
<td>Municipal env. officer/ Contractor/ NGOs/ local communities</td>
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</tr>
<tr>
<td>Water pollution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Contractor/ Municipal council/ Env. Supervisor</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>Nitrate</td>
<td>Three times a year</td>
<td></td>
<td>mg/l</td>
<td></td>
<td>Sampling and analysis (Spectrophotometer)</td>
<td>30</td>
<td>Contractor/ Municipal council/ Env. Supervisor</td>
<td>1200</td>
</tr>
<tr>
<td>Lead</td>
<td>Three times a year</td>
<td>Along River Burka/ ground water sources nearby</td>
<td>mg/l</td>
<td></td>
<td>Sampling and analysis (AAS)</td>
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<td>Contractor/ Municipal council/ Env. Supervisor</td>
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<tr>
<td>Sulphate</td>
<td>Three times a year</td>
<td></td>
<td>mg/l</td>
<td></td>
<td>Sampling and analysis (Spectrophotometer)</td>
<td>600*</td>
<td>Contractor/ Municipal council/ Env. Supervisor</td>
<td>1200</td>
</tr>
<tr>
<td>Turbidity</td>
<td>Three times a year</td>
<td></td>
<td>mg/l</td>
<td></td>
<td>Sampling and analysis (Spectrophotometer)</td>
<td>30</td>
<td>Contractor/ Municipal council/ Env. Supervisor</td>
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<tr>
<td>Hydrocarbons</td>
<td>Three times a year</td>
<td></td>
<td>mg/l</td>
<td></td>
<td>Sampling and analysis (Spectrophotometer)</td>
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<td>Contractor/ Municipal council/ Env. Supervisor</td>
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<tr>
<td>pH</td>
<td>Three times a year</td>
<td></td>
<td></td>
<td></td>
<td>pH Meter</td>
<td>6.5-9.2</td>
<td>Contractor/ Municipal council/ Env. Supervisor</td>
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</tr>
<tr>
<td>Noise pollution</td>
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<td></td>
<td></td>
<td></td>
<td>Noise meter</td>
<td>55</td>
<td>Contractor/ Municipal council/ Env. Supervisor</td>
<td>1000</td>
</tr>
<tr>
<td>Construction</td>
<td></td>
<td>Project site</td>
<td></td>
<td></td>
<td>Detector tubes</td>
<td>150</td>
<td>Contractor/ Municipal council/ Env. Supervisor</td>
<td>1000</td>
</tr>
<tr>
<td>PM&lt;sub&gt;10&lt;/sub&gt;</td>
<td>Twice during construction</td>
<td>Project site</td>
<td></td>
<td></td>
<td>Mini-Vol Sampler</td>
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<td>Contractor/ Municipal council/ Env. Supervisor</td>
<td>1000</td>
</tr>
<tr>
<td>CO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>Twice during construction</td>
<td>Project site</td>
<td>ppm (1hr)</td>
<td></td>
<td>Detector tubes</td>
<td>35</td>
<td>Contractor/ Municipal council/ Env. Supervisor</td>
<td>1000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Monitoring frequency</th>
<th>Sampling Area</th>
<th>Measurement Units</th>
<th>Method</th>
<th>Target level/ Standard</th>
<th>Responsibility for monitoring</th>
<th>Annual costs estimates (USD)</th>
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</thead>
<tbody>
<tr>
<td>Interference to local hydrology</td>
<td>Hydrometric</td>
<td>Once in a month during rain season in the construction period</td>
<td>River Burka/ground water sources nearby</td>
<td>Flooding levels Volumetric measurements</td>
<td>-</td>
<td>Envi. Supervisor Municipal Council/Contractor</td>
<td>1,000</td>
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<tr>
<td>Biodiversity</td>
<td>biodiversity</td>
<td>Twice per year</td>
<td>Along River Burka/ground water sources nearby/swamps</td>
<td>Type and number of living and organisms inspection</td>
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<td>Municipal Council/Contractor/NGOs/local communities</td>
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</tr>
<tr>
<td>Vibration</td>
<td>Vibration levels</td>
<td>Twice a year</td>
<td>Project sites and all borrow pits</td>
<td>Number Vibration meter</td>
<td>-</td>
<td>Contractor</td>
<td>1,000</td>
</tr>
<tr>
<td>Frequency of illness of construction workers</td>
<td>ill health of construction workers</td>
<td>Once in a month for the construction period</td>
<td>Project site</td>
<td>Number of cases Health records</td>
<td>-</td>
<td>Municipal Health officers</td>
<td>1,000</td>
</tr>
<tr>
<td>Employment opportunity</td>
<td>Percentage of local construction labourers</td>
<td>Three times a year</td>
<td>Project site</td>
<td>Number of local people employed in the project Records, inquiries and observation</td>
<td>-</td>
<td>Municipal councils</td>
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</tr>
<tr>
<td>Safety and health risks</td>
<td>Number and type of safety equipment such as mask, helmet, gloves and ear plugs, Health and sanitation facilities in camps.</td>
<td>Once a year</td>
<td>Project site</td>
<td>Number of safety measures provided</td>
<td>Records, inquiries and inspection</td>
<td>-</td>
<td>NEMC/Municipal Council/Contractor</td>
</tr>
</tbody>
</table>
## Provision of Consultancy Services for Preparation of Preliminary and Detailed Engineering Design, Cost Estimates, Bidding Documents and Environmental and Social Impact Assessments for the Investments in Sub-projects in ARUSHA Municipal Council under the Proposed Tanzania Strategic Cities Project

<table>
<thead>
<tr>
<th>Dust</th>
<th>Water sprinkling</th>
<th>Project site</th>
<th>Frequency of water sprinkling</th>
<th>Inquiries and observation</th>
<th>Minimum dust emission</th>
<th>Contractor</th>
<th>Included in the contract lamp sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation stage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air pollution</td>
<td>CH$_4$</td>
<td>Twice for the first two years</td>
<td>Project site</td>
<td>µg/m$^3$</td>
<td>Detector tubes</td>
<td>Contractor/Municipal Council/ Env. Section of the Municipal council</td>
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<tr>
<td></td>
<td>SO$_2$</td>
<td>Twice for the first two years</td>
<td>Project site</td>
<td>mg/kg (hourly)</td>
<td>Detector tubes</td>
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<td>1000</td>
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<tr>
<td></td>
<td>NO$_x$</td>
<td>Twice for the first two years</td>
<td>Project site</td>
<td>µg/nm$^3$ (24 hrs)</td>
<td>Detector tubes</td>
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<td>1000</td>
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<tr>
<td></td>
<td>Dust pollution (PM$_{10}$)</td>
<td>Twice for the first two years</td>
<td>Project site</td>
<td>µg/nm$^3$ (hourly)</td>
<td>Mini-Vol Sampler</td>
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<td></td>
<td>CO$_2$</td>
<td>Twice for the first two years</td>
<td>Project site</td>
<td>ppm (1hr)</td>
<td>Detector tubes</td>
<td>35</td>
<td>1000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency of illness landfill operators</th>
<th>Project site</th>
<th>Number of cases</th>
<th>Health records</th>
<th>Contractor</th>
<th>Included in the contract lamp sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>illhealth of operation workers</td>
<td>Twice a year</td>
<td>-</td>
<td>Municipal Health officers</td>
<td>800</td>
<td></td>
</tr>
</tbody>
</table>

| Operation stage |
| Noise pollution | Noise level | Once in 3 months | Project site | dBA (equivalent) | Noise meter | 55 | Contractor/Env. Section of the Municipal council | 1500 |

| Water pollution | Mercury | Three times a year | In River Burka, and other ground water sources nearby | mg/l | Sampling and analysis (Spectrophotometer) | 0.05 | 1200 |
| Nitrate | Three times a year | mg/l | 30 | Contractor/Env. Section of the Municipal council | 1200 |
| Lead | Three times a year | mg/l | Sampling and analysis (Spectrophotometer) | 0.05 | 1200 |
| Sulphate | Three times a year | mg/l | Sampling and analysis (AAS) | 600* | 1200 |
| Turbidity | Three times a year | mg/l | Sampling and analysis (Spectrophotometer) | 30 | 300 |
| Hydrocarbons | Twice a year | mg/l | Sampling and analysis (Spectrophotometer) | 1200 |
| pH | Three times a year | mg/l | pH Meter | 6.5-9.2 | 300 |
| BOD | Twice a year | mg/l | Sampling and analysis (BOD Track) | 30 | 600 |

<table>
<thead>
<tr>
<th>COD</th>
<th>Twice a year</th>
<th>mg/l</th>
<th>Sampling and analysis (Spectrophotometer)</th>
<th>60</th>
<th>600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total monitoring costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(UWP Consult, 2009)
9.4 Institutional arrangements and reporting procedures

The Municipal council, assisted by environment specialists, will be responsible for reviewing civil works contracts in accordance with the ESIA report; coordinating the implementation of the ESMP among the contractors, local environmental authorities (e.g., Ward Development Committees; monitoring the implementation of the ESMP and the civil works contracts in collaboration with NEMC and PMO-LGRG; and, preparing annual environmental progress reports.

The purpose of environmental and social monitoring is to quantitatively measure the environmental effects of the road project. The environmental monitoring program will operate through the preconstruction, construction, and operation phases. It will consist of a number of activities, each with a specific purpose, key indicators, and significance criteria.

The monitoring of mitigation measures during design and construction will be carried out by an Environmental/Social Specialist. He/she will conduct mitigation monitoring as part of the regular works inspections. The responsibility for mitigation monitoring during the operation phase will lie with the Environmental Section in the Municipal Council.

The Municipal council will provide PMO-LGRG and NEMC with reports on environmental compliance during implementation as part of their annual progress reports and annual environmental monitoring reports. Depending on the implementation status of environmentally sensitive areas of the project, NEMC will perform annual environmental reviews in which environmental concerns raised by the project will be reviewed alongside project implementation.

9.5 Capacity building and training programmes

Inadequate knowledge based and technical manpower in Environmental and social impacts business, both at private and public sectors will hinder the pace of its effective use in project such as this.

The efforts for capacity building on environmental and social impacts to people who will be involved with the project in one way or another should go hand-in-hand with awareness raising to decision makers at various levels in the project area, project implementers and stakeholders about its importance, usefulness and value of using this tool to make the project environmental friendly and cost effective on the long run on the environmental grounds.
10.0 COST BENEFIT ANALYSIS OF THE PROJECT

10.1 Introduction

This section addresses financial analysis, economic analysis of the project and an extended cost-benefit analysis for the proposed project. What is presented here is an indicative and elementary description of the costs and benefits. It is based on the indicative costs for implementation of enhancement and mitigation measures as well as the cost of monitoring.

The Indicative Planning Figure for these sub-projects in Arusha Municipality is T.Shs. 21 billion.

10.2. Benefits related to the project

Several benefits are associated with the proposed development both at local and national level in terms of improved infrastructure in the municipality, stimulation of the economy at local and regional level, improved public health and reduction in environmental degradation. The proposed subprojects will generate employment opportunities during construction and during operation (for the landfill), which may be filled by local people with relevant skills. This opportunity will be supporting government initiatives to create employment opportunities for Tanzanians and to meet the target of creating 1 million jobs per year as aimed by the Government. From employment, workers will gain incomes that will improve their quality of life and perhaps change their life style and – although it is not clear for now how much will be paid to each worker and for each qualification. Workers will also gain knowledge, especially during the construction and operation of the landfill, a relevantly new technology in Tanzania. It is expected that employment opportunities and the salaries provided will extend beyond the workers and benefits as many people as possible, including several dependants.

Nevertheless, employment opportunities and the benefits therein will depend on whether there are suitably qualified local personnel that can take up positions in the construction works. Capacity building therefore is a prerequisite for these benefits to be realized.

The project will also reduce flood in the CBD, in Bondeni area, and hence reduce risks of property destruction, eruption of diseases and improve the status of the market near the area as well as the municipal at large.
Construction of the road will easy transport in the Municipality, reduce traffic congestion and hence save the travelling time and costs to a large extent. The selection of the project roads by the municipal was such that, the feeder roads and roads connecting working area without passing through the CBD are improved. Presence of a good transportation network shall enhance trade in the Municipality, and hence increase the stimulation of the municipal economy. The road network shall also efficient the municipal waste management by easing transportation of waste from the municipal to Murriet landfill in Sokon 1.

10.3 Costs related to the project

The estimated costs for implementing the proposed Environmental and Social Mitigation Plan is estimated to be about 110,500 USDs, while the costs for Environmental and Social Monitoring Plan has been estimated to be about 95,840 USDs.

Most of the impacts, with the exception of the construction of Murriet landfill shall only to be realized during construction phase, the costs for these will also be short term, especially if mitigation measures are fully implemented. Long term impacts include environmental impacts resulting from abandoned burrow pits/ sand quarries. In this case, while construction will take short time, if the burrow pits are not rehabilitated, their costs will go beyond the construction phase.

It is worth noting that most of the mitigation measures proposed are just good engineering practise, and that the project costs out weights the project benefits.
11.0 DECOMMISSIONING AND DEMOBILIZATION PLAN

11.1 Decommissioning

Decommissioning is not anticipated for cluster I and II in the foreseeable future. However, Cluster III (the Landfill) will require decommissioning. Decommissioning will entail continued monitoring and maintained of gas and leachate control systems.

The most important part of landfill closure and restoration plan, where ground water protection measures are in place, is to construct low permeability cover or cap, over the waste when the final elevations reached. The following procedures are typically proposed to close and restore a landfill:

1. Cover all the waste
2. Permit sufficient time for settling of any recently deposited waste
3. Apply final cover
4. Grade final slopes to around 5%
5. Install permanent systems of surface drainage channels on the landfill
6. Check sediments and erosion control and modify according to any changes in slopes
7. Disassemble temporary structures (i.e. campsite) and waste receiving areas not required for the after use of the site
8. Seed the final cover with appropriate mixture of grasses.
9. Outline a timetable to ensure that that the following features are inspected at appropriate regular intervals:
   10. Settlement. Cover soil integrity and need for grading
    11. Sedimentation and erosion control facilities
    12. Leachate and gas control
    13. Vandalism and squatting prevention measures
    14. Vegetation
    15. Fencing
    16. Monitoring systems.

11.2 Demobilization of the project

11.2.1 Introduction

Upon completion of the Contracted Work, the contractor shall remove all of its tools, materials and other articles from the construction area. Should the Contractor fail to take prompt action to this end, the Municipal council, at its
option and without waiver of such other rights as it may have, upon sixty (60) calendar days notice, may treat such items as abandoned property. The Contractor shall also clean areas where he worked, remove foreign materials and debris resulting from the contracted work and shall maintain the site in a clean, orderly and safe condition.

Materials and equipment shall be removed from the site as soon as they are no longer necessary to minimize the demobilization work after completion of the project. Before the final inspection, the site shall be cleared of equipment, unused materials and rubbish so as to present a satisfactory clean and neat appearance.

All the camp sites will be built as temporary structures and these will also include the use of movable structures such as movable containers. All the temporary structures will be demolished after accomplishing the contracted jobs.

**11.2.2 Impacts of the Demobilization of project**

- Loss of jobs and Resettlement
- Air water and soil pollution
- Noise pollution
- Closing down of borrow pits

**o Loss of jobs and Resettlement**

The local population that will be employed in the project during construction of the road will lose jobs immediate after the closure of the project. The loss of jobs will have far reaching impacts. Resettlement is certainly for those who will migrate to the areas along the road as job seekers after the secession of the project.

**Mitigation**

Establish some small group business and Saccos to assist people access loans to enable them run small businesses.

**Monitoring**

- The social response to the problem of unemployment
- Settlement pattern of people resuming their previous life after termination of work.

- Air, water and soil pollution
During the demobilization movement of heavy duty equipments shall contribute to air pollution as the result of operation of the vehicles and equipments. This may also be accompanied by the soil and water pollution that might result from spillage of oil and fuel.

**Mitigation**

- Care shall be taken to prevent spillage on haul routes. Any such spillage shall be removed immediately and the area cleaned.

- The effects of the emission will be minimal due to intensified vegetative cover that will be provided in the area.

**Monitoring**

- Motoring various parameters in air, water and soil such as CO₂, SO₂, Nitrate, Sulphates, Lead, oils and petroleum, hydrocarbons etc.

  - **Noise pollution**

The problem of the noise pollution caused by the demobilization will have little impact since this will be done once.

**Mitigation**

- Use machines with silencer or with low levels of noise.

**Monitoring**

- Monitor the levels of noise (dBA)

  - **Closing down of borrow pits and quarry site**

All the borrow pits and quarry site need to be reinstated to minimise the erosion problems, unaesthetical environments and creation of mosquito breeding stations.

**Mitigation**

- Back fill the borrow pits with top soils stockpiled along the project road
- Modify the borrow pits which doesn’t present a threat of turning out to be breeding station of mosquitoes to a dam for collection of rainwater to be used as reliable water sources in the project areas.
- Replanting of vegetations on the banks of the borrow pits to minimise the erosion

**Monitoring**

- Soil erosion
- Conditions of the abandoned borrow pits
- Growth of the vegetation replanted on the borrow pits
It can be concluded that the primary objective of the demobilization exercise is to clean up the project site to a condition suitable for use by the community. All potentially harmful contaminants at the site will be thoroughly removed, treated and disposed of in an environmentally acceptable manner. With the implementation of the precautionary and mitigation measures recommended in the EIA report, the demobilization of the project will comply with all environmental standards and legislation.
12.0 SUMMARY AND CONCLUSION

The EIA study results show some limited negative environmental implications of the project, the core urban infrastructure will have high socio-economic benefits to the people of Arusha Municipality and adjoining regions as well. The associated negative impacts, to a large extent have been minimized through good engineering design and envisaged construction practices. Specific mitigation measures have been suggested in this report to offset some of the inherent adverse impacts especially those linked to land, water and air pollution. Implementing these mitigation measures would increase environmental soundness of the project.

It is, therefore, concluded that, implementation of the proposed Investment subprojects will entail no detrimental impacts provided that the recommended mitigation measures are adequately and timely put in place. The identified adverse impacts shall be managed through the proposed mitigation measures and implementation regime laid down in this EIS. Arusha Municipal Council are committed in implementing all the recommendations given in the EIS and further carrying out the environmental auditing and monitoring schedules.

REFERENCES

1) Arusha Strategic City Project (2009-2013)
2) United Republic of Tanzania (2005), EIA and Audit Regulations
3) United Republic of Tanzania (2007), EIA Guidelines (Draft)
4) World Bank Operational Policy 4.01
ANNEX 1. TERMS OF REFERENCE
ANNEX 1. TERMS OF REFERENCE

BACKGROUND

Local Government Support Project (LGSP)

The Government of the United Republic of Tanzania (GoT) has received a credit from the International Development Association (IDA) towards the cost of the Local Government Support Project (LGSP). It is intended that part of the proceeds of the credit will be used to cover eligible payments under the contract for the Provision of Consultancy Services for Preparation of Preliminary and Detailed Engineering Designs, Cost Estimates and Bidding Documents, and Environmental and Social Impact Assessments for the Investment Sub-Projects in Arusha Municipal Council under the proposed Tanzania Strategic Cities Project (TSCP).

The LGSP, which is in advanced stage of implementation, became effective in April 2005, and is expected to close on June 30, 2011.

Proposed Tanzania Strategic Cities Project (TSCP)

The GoT and the World Bank are preparing a new credit for the proposed Tanzania Strategic Cities Project (TSCP). The overall objective of the TSCP is to: (i) improve basic urban infrastructure and services in selected urban LGAs; and (ii) strengthen the management and fiscal capacity of those urban LGAs for improved operations, maintenance and infrastructure development.

The proposed project is estimated to cost of US$ 150 million, to be implemented over a period of five years. The project would target seven selected urban LGAs. The selected urban LGAs to be supported under the proposed credit are: Mwanza, Arusha, Mbeya, Tanga, Dodoma, Kigoma and Mtwara. At this stage, it is anticipated that the project would consist of the following three components:

**Component 1(a): Core urban infrastructure:** This sub-component would support: (i) urban roads and drainage, including associated structures such as drainage ditches, culverts/bridges, footpaths and street lighting; (ii) liquid and solid waste management including collection, transportation and disposal; (iii) community infrastructure upgrading; and (iv) local infrastructure such as bus stands and lorry stands/parking areas.

**Component 1(b): Strategic economic infrastructure:** This sub-component would support strategic investments falling outside the traditional mandates of the urban LGAs. The sub-component would aim to reinforce synergies across sectors and begin to address some of the key impediments to realizing the economic
potential of Tanzania’s cities. It could support infrastructure investments and/or feasibility studies and related preparatory consultancies covering: (i) energy distribution; (ii) port and transport services; and (iii) peri-urban areas (outside but adjacent to urban LGAs).

**Component 2: Institutional strengthening:** The objective of this component is to strengthen the fiscal and management capacity of the seven selected urban LGAs for improved O&M and infrastructure development. The intended outcomes include: (a) improved capacity for technical design, procurement, financial management, contract management, and environmental and social safeguards for urban infrastructure development; (b) improved asset management and O&M; (c) enhanced cost recovery and management of key urban services including solid waste; and (d) improved own source revenue.

**Component 3: Implementation Support.** This component will cover: (i) support to PMO-RALG and LGAs to enhance capacity for project management, monitoring, reporting, environmental and social safeguards, and audit systems; (ii) design work and preparation of future urban projects, including a separate Dar es Salaam project; (iii) further design work or related consulting services (beyond that completed during preparation); (iv) consultancy services for Mid-Term Review (MTR); and (v) additional TA relevant to the urban sector.

**Progress on TSCP Component 1(a): Core Urban Infrastructure**

**Indicative Planning Figures (IPFs) for the selected LGAs:** The allocation of funds across the selected urban LGAs was guided by considering the relative strengths of the urban LGAs in terms of: (i) urban population; (ii) economic activities; and (iii) own source revenue (a proxy for capacity for O&M and sustainability). The following are allocations in the form of IPFs notified to the selected LGAs for planning of investment sub-projects to be supported under Component 1(a) for the Core Urban Infrastructure:

<table>
<thead>
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<th>Urban LGA</th>
<th>IPF (TZS Billion)</th>
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<tbody>
<tr>
<td>Mwanza</td>
<td>21.0</td>
<td></td>
</tr>
<tr>
<td>Arusha</td>
<td>21.0</td>
<td></td>
</tr>
<tr>
<td>Mbeya</td>
<td>21.0</td>
<td></td>
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<tr>
<td>Tanga</td>
<td>21.0</td>
<td></td>
</tr>
<tr>
<td>Dodoma</td>
<td>32.0</td>
<td>Dodoma MC = 16; CDA = 16</td>
</tr>
<tr>
<td>Kigoma</td>
<td>16.0</td>
<td></td>
</tr>
<tr>
<td>Mtwara</td>
<td>16.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>148.0</strong></td>
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</table>
Principles for selection of sub-projects: The selection of sub-projects in urban LGAs was guided by the following principles:

- Consistent with, and in furtherance of, the overall project development objective.
- Capable of being fully implemented within a maximum of three years.
- Demand driven, reflecting the infrastructure priorities expressed by the participating urban LGAs and their stakeholders.
- Being able to have measurable impact that meets pre-agreed indicators.
- Socially, environmentally, and financially sustainable (e.g. in terms of the operation and maintenance requirements).
- Complementary to other sectoral investments.
- Consistent with the National Framework on Participatory Planning and Budgeting, other aspects of the Tanzanian regulatory framework, and with World Bank guidelines and safeguard policies.

ASSIGNMENT OBJECTIVES

The basic objectives of this consultancy assignment are to:

- Prepare preliminary designs and cost estimates for the LGA sub-projects and group them into two phases for implementation purposes.
- Prepare detailed designs, drawings and cost estimates for the LGA sub-projects, package them into suitable contracts, prepare final bidding documents and overall time-bound implementation schedule.
- Conduct an Environmental and Social Impact Assessment (ESIA) of individual sub-projects proposed for investment in the urban LGAs and prepare an overall ESIA report for the LGA investments.
- Prepare Environmental Management Plans (EMPs) and where necessary, Resettlement Action Plans (RAPs) and, in the case of Arusha, Indigenous Peoples Development Plans (IPDPs) for individual sub-projects and prepare overall EMP and RAP for the LGA investments.
SCOPE OF WORK

Overview

The overall scope of the consultancy assignment comprises the preparation of preliminary and detailed designs, drawings, cost estimates, suitable contract packages, final bidding documents and overall time-bound implementation schedules, and the preparation of environmental and social impact assessments, preparation of environmental management plans and, where necessary, resettlement plans and indigenous peoples development plans, for all investment sub-projects proposed by the Arusha Municipal Council for financing under the core urban infrastructure sub-component of the TSCP.

The indicative scope of works for the Arusha Municipal Council is as follows:

- New construction/upgrading/rehabilitation of approximately 30 km of roads to asphalt concrete (bitumen surfacing); including vertical and horizontal alignments, pavement design, concrete bridges, drainage structures, street lights, traffic lights, etc.

- Construction of approximately 1 km of lined storm water drains; including alignment and structural designs etc. for flood control in the central business district (CBD).

- Rehabilitation and expansion of Muriet dumpsite; including creation of additional cells, construction of 1 km inner roads, storm water drains and leachate stabilisation lagoons.

- Acquisition of a package of solid waste management equipment (skip loaders, buckets, tipper/trucks, hand refuse street containers, compactors, weighbridge etc)

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENTS

(a) Undertake Environmental and Social Impact Assessment (ESIA) for each sub-project proposed by the LGA for funding under the TSCP. The ESIA should conform to World Bank requirements as specified in the World Bank’s Operational Policy for Environmental Assessment (OP 4.01). Determine design or operating quality standards to meet compliance with environmental safeguards (e.g. water quality standards, air, and health and safety requirements); national laws and regulation on environmental assessment. The results of the ESIA for each sub-project should be used to prepare an Environmental Management Plan (EMP) for the sub-project and these further be consolidated respectively into an overall ESIA Report and EMP for the LGA investments under TSCP. The Consultant should also assist the developer/LGA through the required review and approval

processes within the GoT and WB up to the disclosure of the documents to the public (see detailed TOR in attachment 1);

(b) As detailed in attachment 2 of the Main TOR, determine whether any resettlement, or temporary displacement, loss of assets, loss of access to assets and services will be required in each sub-project area, based on its ESIA report. If it is determined that resettlement is required, compile a list of Resettlement Actions (RAs) required for each sub-project and prepare a Resettlement Action Plan (RAP) for the sub-project. Prepare an overall RAP for the LGA investments under TSCP; assist the developer/LGA through the required GoT and WV review and approval processes up to the disclosure of the documents to the public;

(c) Some sub-projects in urban LGAs and vicinity, may directly affect indigenous peoples, such as the Hadzabe, who may have moved into the area. The ESIA in such LGAs will determine the presence of indigenous peoples (as defined in the World Bank guidelines) and the impact of the sub-projects on them. If indigenous peoples are impacted by the sub-projects, the consultants will develop an Indigenous People’s Development Plan (IPDP) as per the guidelines (attachment 2-A) provided in the Indigenous People’s framework to assist in development of specific programs that may affect the livelihoods (markets) and mobility (roads – grazing pastures) of the affected communities. The development plan must be prepared through active participation of the affected community.

(d) Note that, In order to meet WB (IDA) disclosure requirements, the draft ESIA, RAPs and IPDP (if required) will need to be reviewed and cleared by the Bank during pre-appraisal and finalized and publicly disclosed in the seven urban centers and Info-Shop at the World Bank prior to appraisal.

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Introduction

These Terms of Reference (TOR) outline the scope of work to be carried out in preparation of an Environmental Management Plan (EMP) for Component 1(a): Core Urban Infrastructure of the proposed Tanzania Strategic Cities Project (TSCP). The EMP will be a compilation of information gathered through Environmental Impact Assessments (EIAs) carried out for all sub-projects to be implemented through Component 1(a) of the TSCP. 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 for the participating urban LGA under the assignment includes: (1) Environmental Overview Report for the LGA; (2) Environmental Management Plans for each sub-project proposed by the LGA, to be an integral part of the consolidated final
LGA sub-projects investment proposal document and; (3) the Environmental Impact Assessment Section prepared for the LGA for incorporation in the Overall Operational Manual for the TSCP. An executive summary synthesizing the process and incorporating the findings from the above reports will also need to be prepared.

Scope of Work

Environmental Overview of urban LGA

The purpose of this section is to provide a broad description of environmental issues facing the City/Municipality and in particular, areas that are adversely affected by poor environmental conditions or contributing to further degradation of the environment. This section will be prepared using secondary data sources and other information collected during the course of the overall design of the sub-projects (see main TOR).

Specifically, the section should include the following:

(a) Background information about the City/Municipality (socio-economic conditions, demography, status of water and environmental quality, etc);

(b) A description of environmental priorities of City/Municipality residents/local authorities;

(c) The number and location of communities living in environmentally vulnerable areas (e.g. close to a polluted canal, poor ventilation causing indoor air pollution, on or adjacent to garbage dumps, close to large enterprises polluting the locality etc);

(d) A review of City/Municipal level environmental and social legislation, regulations and procedures that facilitate or hinder improvements in environmental conditions.

(e) An outline of the institutional framework for addressing environmental issues posed by the proposed sub-projects under Component 1(a): Core Urban Infrastructure; and the related capacity building requirements.

Environmental Management Plans (EMPs)

An EMP will be prepared for each of the sub-project areas. The purpose of EMPs is to ensure that the interventions targeted by the proposed sub-project are environmentally sound and sustainable. The preparation of these plans should be done in tandem with the sub-projects design process and follow a participatory process. EMPs should form an integral part of the consolidated final LGA sub-projects investment proposal document; and the Consultant should inform, advise and consult with community organizations in sub-project areas while preparing these plans.
Specifically, each EMP should detail the following:

(a) describe the environmental conditions and identify the possible adverse environmental problems associated with the proposed sub-project, which the EMP is intended to deal with;

(b) assess whether proposed infrastructure interventions will address or exacerbate environmental problems and identify alternatives;

(c) propose and describe mitigation actions that need to be implemented at the community/LGA-level and indicate how and when they will be implemented. These actions should be reflected and costed in the preliminary and detailed engineering designs;

(d) define the institutional arrangements at the community/LGA-level, by specifically describing who will be responsible for implementing the EMP during construction, operation and maintenance of the sub-project including the environmental mitigation actions;

(e) Review the capability of institutions at all levels (i.e. staffing, training requirements, and other necessary support services to implement the mitigation measures) and recommend steps to strengthen or expand them in order for the EMP to be effectively implemented;

(f) prepare a monitoring program that will involve communities/LGA as appropriate to assess environmental effects of the project – both positive and negative;

(g) in the event of resettlement or relocation, environmental conditions of the new site should be assessed before a decision is made on the suitability of this site; where applicable, assess compensation to affected parties for impacts that cannot be mitigated;

(h) propose an environmental education and public hygiene awareness program; and

(i) compile the above in the form of an EMP for the sub-project and integrate it to the Overall EMP for the LGA that should form an integral part of the consolidated final LGA sub-projects investment proposal document.

Environment Section for the TSCP Operational Manual

The purpose of this Section in the TSCP Operational Manual is three-fold: (i) establish the appropriate institutional arrangement for managing the environmental assessment process; (ii) guide the development of possible future sub-projects; (iii) catalogue the “typical” environmental mitigation measures that need to be incorporated in the engineering design of any variation/additional works or additional sub-projects.

Specifically, the Section for the Manual should include the following:

(i) the process used to prepare EMPs
(ii) institutional arrangements and responsibilities for identifying, appraising, evaluating and monitoring EMPs at the City/Municipal and community level;
(iii) checklist and guidelines to be used for sub-project EIAs, including a summary of relevant planning, building and environmental codes and standards of GoT;
(iv) formats for EMPs
(v) guidelines for sub-project appraisal;
(vi) guidelines for assessing variation/additional works or additional sub-projects;
(vii) overall environmental monitoring and evaluation framework for the sub-projects investment implementation programme; and
(viii) capacity building program for environmental assessment in the implementation units, local authorities and at the relevant community-level

Executive Summary

The Executive Summary should synthesize the three outputs mentioned above in accordance with the World Bank’s OP 4.01 for Environmental Assessment. This document will be distributed to the Bank’s Executive Directors 120 days before Board presentation.

Public Disclosure

All the above documents should be available to the public. Sub-project EMP at the community-level where the sub-project is located, and the Overall EMP and Operations Manual Section at City/Municipal-level and Nationally. Records of consultation and disclosure should be maintained and reported in the Executive Summary.

Inputs

The Consultant team should include, at least, an environmental planner/expert, who should be familiar with liquid and solid waste management; as well as institutional and capacity building issues in relation to environment in urban LGAs. He/She should have registration/accreditation (or be able to get registration/accreditation based on possessed qualifications and experience once contracted for the assignment); with relevant environmental bodies such as NEMC, GoT Department for Environment etc. A qualified sociologist and experts in other disciplines should be drawn in as and when required.
ASSIGNMENT DURATION

The assignment is expected to take approximately nine (9) calendar months to complete, from early June 2009. However, the Consultant will be responsible for carrying out revisions/improvements etc as advised by the approving bodies/authorities (including GoT and its agencies, World Bank etc.) up to the time the documents get the necessary approvals for project implementation.

MANAGEMENT OF ASSIGNMENT

The Consultant shall undertake the assignment under the overall supervision of the Director of Local Government, Prime Minister’s Office, Regional Administration and Local Government (PMO-RALG), but will work closely with the relevant urban LGAs (Council Management and Staff, Officials and Staff in the Regional, District and Community leadership, NGOs, CBOs, social and environmental organisations and other stakeholders in the project areas).

KEY DOCUMENTS

- Lists of LGAs’ sub-projects investment proposals submitted in January 2009 for reference, noting that some variations may occur as the lists get finalised during the project preparation cycle
- Necessary introduction letters to facilitate activities in relation to proposal preparation and execution of the assignment (if requested)

However, consultants are advised (through own efforts) to access other key documents mentioned or referred to in the TORs; or any other documents found to be necessary for preparation of proposal or execution of the assignment.

(e) An action plan of measures to ensure that the Indigenous Peoples receive social and economic benefits that are culturally appropriate, including, if necessary, measures to enhance the capacity of the project implementing agencies.

(f) When potential adverse effects on Indigenous Peoples are identified, appropriate action plans to avoid, minimize, mitigate, or compensate for these adverse effects.

(g) The cost estimates and financing plan for the IPDP.

(h) Accessible procedures appropriate to the project to address grievances by the affected Indigenous Peoples’ communities arising from project
implementation. When designing the grievance procedures, the borrower takes into account the availability of judicial recourse and customary dispute settlement mechanisms among the Indigenous Peoples.

(i) Mechanisms and benchmarks appropriate to the project for monitoring, evaluating, and reporting on the implementation of the IPP. The monitoring and evaluation mechanisms should include arrangements for the free, prior, and informed consultation with the affected Indigenous Peoples’ communities.
ANNEX 2. LIST OF STAKE HOLDERS CONSULTED

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<thead>
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<tr>
<td>1</td>
<td>Engineer</td>
<td>Emaar Project Management</td>
<td>Eng. N.A. Njori</td>
<td>09/09/09</td>
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<td>09/09/09</td>
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<td>Construction Engineering</td>
<td>Eng. N.A. Njori</td>
<td>09/09/09</td>
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<td>Eng. N.A. Njori</td>
<td>09/09/09</td>
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LIST OF STAKEHOLDERS CONSULTED
TANZANIA STRATEGIC CITIES PROJECT (TSCP)
EIA OF THE INVESTMENT SUBPROJECTS IN TANGA CITY AND ARUSHA MUNICIPALITY UNDER THE PROPOSED

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**LIST OF STAKEHOLDERS CONSULTED**

**TANZANIA STRATEGIC CITIESS PROJECT (TSCEP)**

EIA OF THE INVESTMENT SUBPROJECTS IN TANAGA CITY AND ARUSHA MUNICIPALITY UNDER THE PROPOSED**

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<td>Vicky M. Tila</td>
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<td>Ho</td>
<td>Afrikam</td>
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<td>John Doe</td>
<td>0286265208</td>
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<td>Na Mara</td>
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<td>Mary Lee</td>
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<td>Julia Green</td>
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<td>John Smith</td>
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List of Stakeholders Consulted:
TANZANIA STRATEGIC CITIES PROJECT (TSCP)
EIA of the Investment Sub-projects in Tanga City and Arusha Municipality under the Proposed...